General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.

- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.

- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.

- This document is paginated as submitted by the original source.

- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.

EFFECT OF YAW ANGLE ON STEERING FORCES FOR THE LUNAR ROVING VEHICLE WHEEL

Andrew J. Green

Army Engineer Waterways Experiment Station

Prepared for:

National Aeronautics and Space Administration

October 1971

TECHNICAL REPORT M-71-7

EFFECT OF YAW ANGLE ON STEERING FORCES FOR THE LUNAR ROVING VEHICLE WHEEL

by

A. J. Green

October 1971

Sponsored by National Aeronautics and Space Administration

Conducted by U. S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi

ARMY-MRC VICKSBURG, MISS.

THE CONTENTS OF THIS REPORT ARE NOT TO BE USED FOR ADVERTISING, PUBLICATION, OR PROMOTIONAL PURPOSES. CITATION OF TRADE NAMES DOES NOT CONSTITUTE AN OFFICIAL ENDORSEMENT OR APPROVAL OF THE USE OF SUCH COMMERCIAL PRODUCTS.

Unclassified
Security Classification

AD/A006 518

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY *(Corporate author)*

U. S. Army Engineer Waterways Experiment Station
Vicksburg, Mississippi

2a. REPORT SECURITY CLASSIFICATION
Unclassified

2b. GROUP

3. REPORT TITLE

EFFECT OF YAW ANGLE ON STEERING FORCES FOR THE LUNAR ROVING VEHICLE WHEEL

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*

Final report

5. AUTHOR(S) *(First name, middle initial, last name)*

Andrew J. Green

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1971	~~59~~ 63	1

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
b. PROJECT NO.	Technical Report M-71-7
c.	9b. OTHER REPORT NO(S) *(Any other numbers that may be assigned this report)*
d.	

10. DISTRIBUTION STATEMENT

Approved for public release; distribution unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY
	National Aeronautics and Space Administration Washington, D. C.

13. ABSTRACT

A series of tests was conducted with a Lunar Roving Vehicle (LRV) wheel operating at yaw angles ranging from -5 to +90 deg. The load was varied from 42 to 82 lb (187 to 365 N), and the speed was varied from 3.5 to 10.0 ft/sec (1.07 to 3.05 m/sec). It was noted that speed had an effect on side thrust and rut depth. Side thrust, rut depth, and skid generally increased as the yaw angle increased. For the range of loads used, the effect of load on performance was not significant.

63

DD FORM 1 NOV 68 1473 REPLACES DD FORM 1473, 1 JAN 64, WHICH IS OBSOLETE FOR ARMY USE.

i.

Unclassified
Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Lunar roving vehicles						
Steering						
Wheels						
Yaw						

ia

FOREWORD

The study reported herein was conducted by personnel of the Mobility Research Branch (MRB), Mobility and Environmental (M&E) Division, U. S. Army Engineer Waterways Experiment Station (WES). The study was sponsored by the Lunar Exploration Office, National Aeronautics and Space Administration, Washington, D. C., and it was under the technical cognizance of Mr. Fritz Kramer of the Astronautics Laboratory, George C. Marshall Space Flight Center, Huntsville, Alabama. The work was performed under NASA - Defense Purchase Request No. H-76596A dated 17 November 1970.

The tests were conducted under the general supervision of Messrs. W. G. Shockley and S. J. Knight, Chief and Assistant Chief, respectively, of the M&E Division; and under the direct supervision of Mr. A. J. Green of the Research Projects Group, MRB. This report was prepared by Mr. Green.

Acknowledgment is made to Dr. D. R. Freitag, Assistant Technical Director, WES, and Mr. J. L. Smith, MRB, for their advice and assistance during this study.

COL Ernest D. Peixotto, CE, was Director of WES during the conduct of this study and preparation of this report. Mr. F. R. Brown was Technical Director.

CONTENTS

SUMMARY

A series of tests was conducted with a Lunar Roving Vehicle (LRV) wheel operating at yaw angles ranging from -5 to +90 deg. The load was varied from 42 to 82 lb (187 to 365 N), and the speed was varied from 3.5 to 10.0 ft/sec (1.07 to 3.05 m/sec). It was noted that speed had an effect on side thrust and rut depth. Side thrust, rut depth, and skid generally increased as the yaw angle increased. For the range of loads used, the effect of load on performance was not significant.

EFFECT OF YAW ANGLE ON STEERING FORCES FOR THE LUNAR ROVING VEHICLE WHEEL

PART I: INTRODUCTION

Purpose

1. At the request of the Astronautics Laboratory of the National Aeronautics and Space Administration (NASA) Marshall Space Flight Center, tests were conducted at the U. S. Army Engineer Waterways Experiment Station (WES) to determine experimentally the magnitude of the cornering forces generated by the Lunar Roving Vehicle (LRV) wheel when it was operating in a lunar soil simulant.* These tests were necessary because very little information is available in the literature, and the information that is available does not cover the entire range of yaw angles or the light loads of the LRV program.

Scope

2. The 50 percent chevron-covered General Motors (GM) wheel was used to conduct towed single-wheel tests in the lunar soil simulant. The yaw angle of the wheel was varied from -5 to +90 deg, i.e. for the 90-deg yaw angle tests, the plane of the wheel was perpendicular to the axis of advance of the wheel. Tests were conducted at three different wheel loads and velocities. The following tabulation is a summary of the test conditions.

---

* Crushed basalt with approximately the same grain-size distribution as that of soils taken from the lunar surface.

Yaw Angle deg	Design Velocity, ft/sec(m/sec) 4.5(1.37) Load, lb(N) 42(187)	62(276)	82(365)	6.5(1.98) 62(276)	8.5(2.58) 62(276)
-5	-	X	-	-	-
0	-	-	-	-	-
+5	X	X	X	X	X
+10	X	X	X	X	X
+15	-	X*	-	-	-
+25	X*	X	X	X	X
+40	-	X	-	-	-
+65	X	-	-	-	-
+85	X	-	-	-	-
+90	X	-	-	-	-

*Duplicate.

In addition to the above, tests were conducted at speeds of 3.5 and 10.5 ft/sec (1.07 and 3.05 m/sec) and at 57-lb (253-N) load at 0-deg yaw angle.

3. This program is regarded as an initial effort. It is anticipated that more detailed testing will be formulated after the data obtained herein have been thoroughly reviewed at the Astronautics Laboratory.

PART II: SOIL AND TEST EQUIPMENT

Soil

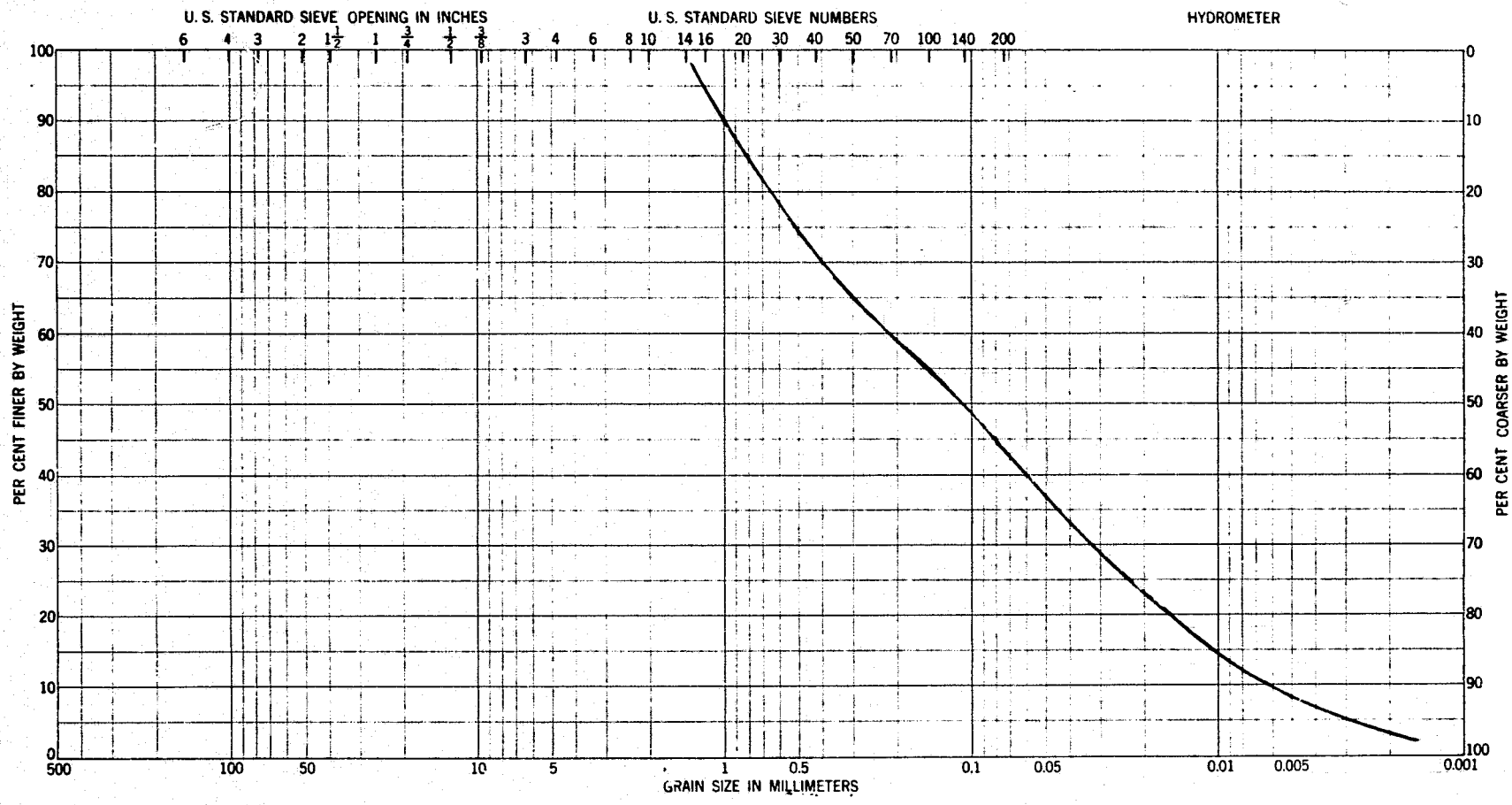
Description

4. The test soil was a crushed basalt purchased from the Basalt Rock Company, Napa, California, and reprocessed to produce a grain-size distribution approximating that of the samples collected during the Apollo flights. Gradation, classification, density, and void ratio data are given in fig. 1. This soil is more-or-less cohesionless, but it exhibits a small amount of cohesion when moist and/or compacted. The soil condition deemed most appropriate for this program was that defined as LSS_4 in earlier studies.* The engineering properties of this material are as follows: penetration resistance gradient G = 3.71 pci (0.98 MN/m^3); dry density γ_D = 95.14 pcf (1.524 g/cm^3); moisture content w = 1.8 percent; friction angle ϕ = 38.5 deg; and cohesion c_{tr} = 0.1 psi (0.76 kN/m^2).

Preparation

5. To prepare the moist basalt (LSS_4), a sufficient quantity of water was added to the material to attain a moisture content of 1.8 percent. The material was then thoroughly mixed in the test bin. To maintain the moisture content as near constant as practical, the test section was covered with an impervious membrane when not in use, and the surface was sprayed very lightly with water at frequent intervals to compensate for evaporation. Before each test, the soil was plowed to a depth of 12 in. (30 cm), and compaction was then applied by dragging

* A. J. Green and K.-J. Melzer, "Performance of Boeing-GM Wheels in a Lunar Soil Simulant (Basalt)," Technical Report No. M-70-15, Oct 1970, U. S. Army Engineer Waterways Experiment Station, CE, Vicksburg, Miss.



C_u: 33.00 e_{max}: 1.116 D': 2.10

d_{50}: 0.11 mm e_{min}: 0.360 γ_s: 2.85 g/cm^3

Fig. 1. Gradation and classification data for the lunar soil simulant

a vibrating plate over the surface of the material. Following this, the surface was screeded level.

6. Since penetration resistance can be related to the other engineering properties of a material, and thus is an expedient means of determining soil properties, it has been used for quality control in this and other wheel performance studies. During the testing cycles, penetration resistance and moisture content were determined frequently, and density was determined occasionally to ensure that the test section had the desired engineering properties at the time of testing.

Test Equipment

Test wheel

7. The wheel used in this program is shown in fig. 2; its load-deflection characteristics are listed in table 1.

Test facility

8. The mesh-wheel tests were conducted in the small-wheel test facility at the WES. This facility consists of an overhead guide track, soil cars, floor tracks, soil processing equipment, and a soil test penetrometer. Riding on the overhead track is a test carriage that is driven by a 30-hp variable-speed drive system. Mounted on the carriage is a dynamometer system.

Dynamometer system

9. The dynamometer system shown in fig. 2 was constructed especially for this program, and it approximates the suspension mechanism on the LRV. The system was instrumented to provide measures of the horizontal force in the plane of the wheel (pull), the horizontal force perpendicular to

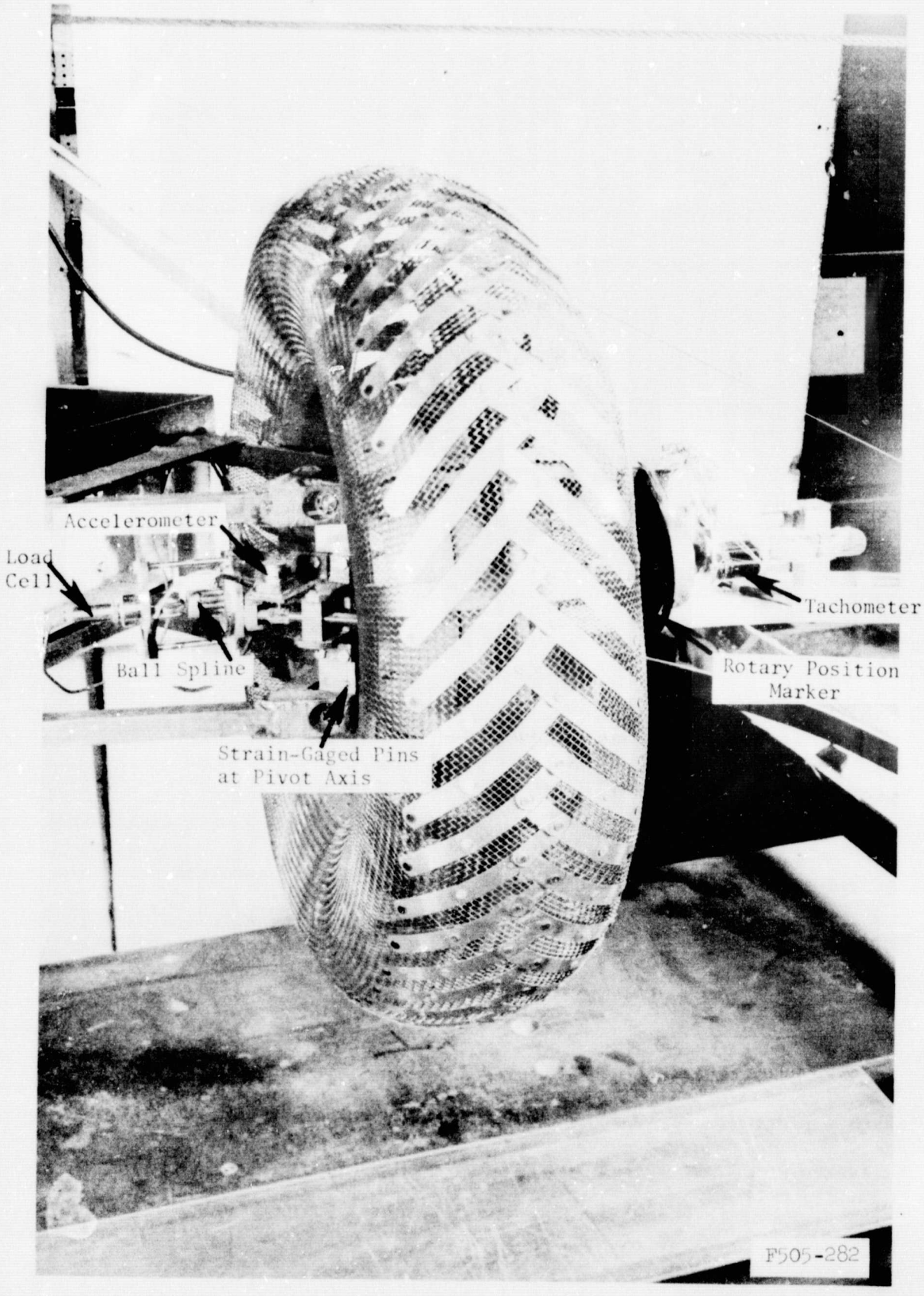


Fig. 2. Wheel and dynamometer system

the plane of rotation (side thrust), the vertical load, hub displacement (sinkage), rotational speed of the wheel, and translational velocity of the system. The design of the system was based on requirements to guide the wheel in a prescribed course, maintain a wheel load from 0 to 100 lb (444.8 N), permit adjustable steering angle from -5 to +90 deg, and allow up to 4 in. (10.16 cm) of sinkage. Additional factors considered desirable, but of secondary importance, were that (a) the suspension system geometry function in a manner similar to that of the actual LRV, and (b) provisions be incorporated for powering the wheel for future tests. Some unexpected problems arose during the construction and installation of the dynamometer system, which delayed the start of the actual testing program. The delay resulted in a decrease in the amount of funds available for performance testing.

10. Measurements. The primary measurement required was side thrust at all steering angles and test conditions. Related control and measurement functions are listed below:

a. Control longitudinal wheel speed.

b. Control longitudinal wheel path.

c. Maintain sinkage reference plane.

d. Control vertical force on wheel.

e. Control yaw angle of wheel.

f. Measure longitudinal wheel speed.

g. Measure longitudinal wheel position.

h. Measure sinkage of wheel.

i. Measure vertical acceleration of wheel.

j. Measure angular wheel speed.

k. Measure angular wheel position.

l. Measure horizontal pull on wheel.

m. Measure horizontal acceleration of wheel.

11. Operation. Operation of the dynamometer will be explained with reference to fig. 2 and to the simplified sketch in fig. 3. The side thrust S on the wheel was transferred from the wheel hub to the ball spline, which, in turn, was restrained by a force sensor (Statham Model UC3). The ball spline was a low-friction device that permitted free linear motion, but prevented rotary motion. The characteristics of the ball spline and the mounting of the force sensor ensured that the sensor was subjected to side thrust only.

12. The longitudinal or translational velocity of the wheel under test was sensed by a tachometer mounted on the drive carriage. Longitudinal position of the wheel axle was derived from slots in plates mounted on the carriage guide track structure. Slot position was sensed by a photocell. Position pulses were transmitted for each 3.9 in. (10 cm) of travel ±0.04 in. (1 mm).

13. The vertical displacement of the wheel hub (sinkage) was measured by a potentiometer coupled to the sinkage frame by a fine wire. Force exerted by this mechanism was a few ounces, and thus negligible in its effect on the vertical wheel force.

14. Vertical force on the wheel was controlled by the number and position of counterweights used. The force exerted by the wheel on the soil was checked during the positioning of the counterweights by supporting the wheel on a platform scale. Once the counterweights were

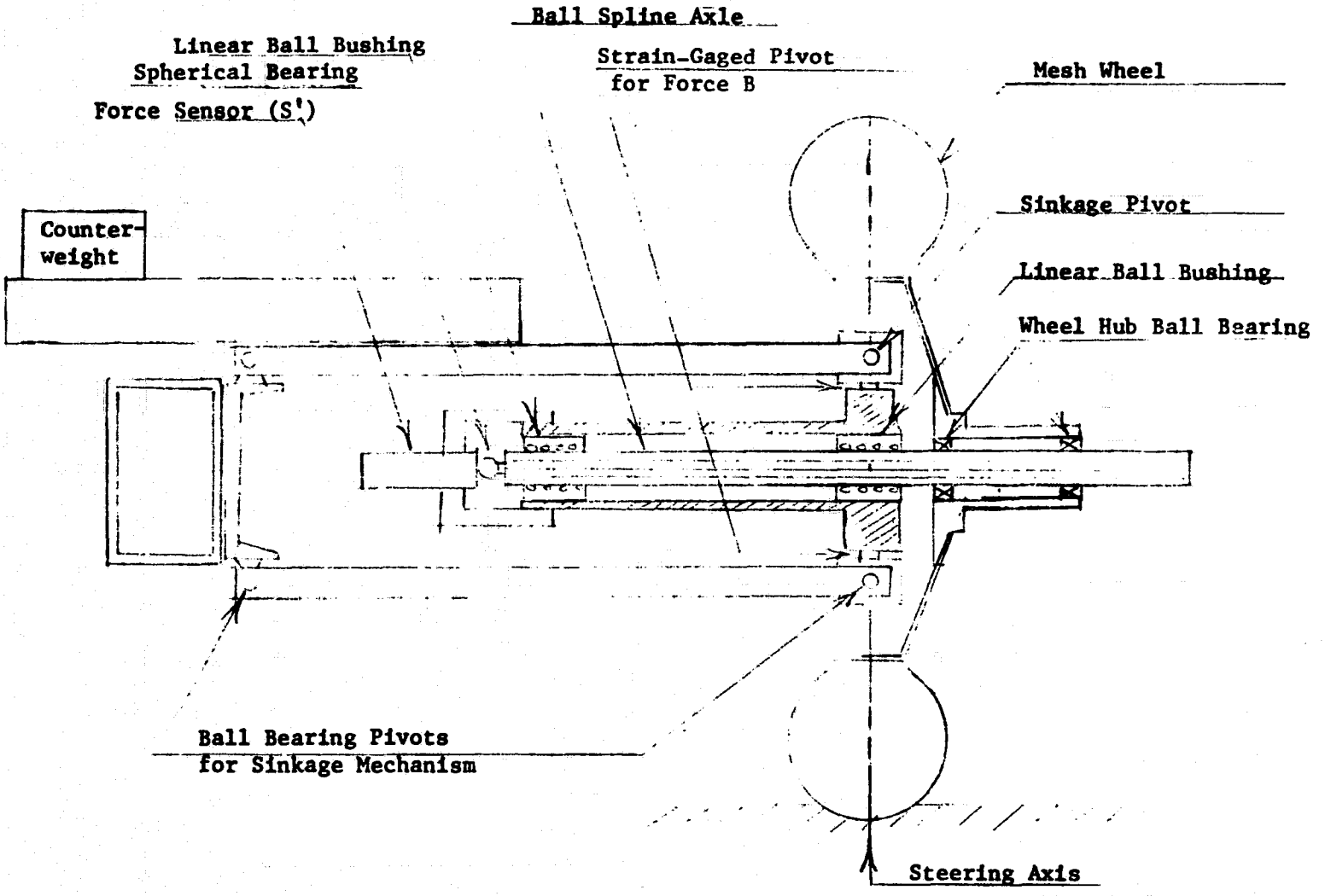


Fig. 3. Side-thrust measurement on mesh wheel

set, the wheel vertical force was fixed at a preselected value, except for dynamic effects. Deviations from the prescribed load value during a test were sensed by an accelerometer mounted near the center of rotation of the wheel.

15. Yaw angle for each test was set by a manually adjusted screw for angles from -5 to +40 deg. For steering angles of +45 to +90 deg, an offset fixture was installed between the dynamometer and the main carriage. This offset fixture added a fixed increment of 45 deg to the steering angle.

16. The angular position of the wheel during a test run was sensed by a slotted disc and photocell mechanism mounted on the wheel hub and axle. The angular velocity of the wheel was sensed by a tachometer mounted in conjunction with the slotted disk and photocells. Signal wires from the tachometer and photocells were run from the mounting point through an unused groove in the ball spline to a cable termination point on the sinkage linkage.

17. Horizontal force B (pull) on the test wheel was sensed by strain gages bonded to the steering pivot posts.

18. Deficiencies. The mesh-wheel dynamometer system met the control requirements but was deficient in several aspects of the measurements. Specific deficiencies and suggested improvements that could be incorporated for future tests include the following:

a. The system performed very well initially in measuring side thrust, but this performance deteriorated with time possibly because of dust settlement on the ball spline shaft. Improved dust covers over the free ends of the spline would prevent this deterioration.

b. Wheel pull values were mixed with values of other forces and moments at the pivot axis area, and this made interpretation of the results difficult. It is suggested that, instead of attempting to resolve wheel pull at this location, the force be measured in the line of travel at the points of attachment of the sinkage mechanism to the main carriage. The wheel pull could then be computed from the line of travel force, side force, and yaw angle.

Recording systems

19. The general measurement system is shown in block diagram form in fig. 4. Signals from the transducers were carried over cables to signal conditioning equipment located in the instrumentation rooms. Signals were then recorded on a direct-writing light-beam oscillograph, an analog magnetic tape recorder, or a digital data acquisition system. Maintenance problems with the digital data acquisition system during the time of the test program forced the use of the analog magnetic tape recorder as the primary data source, and the records were later digitized off-line.

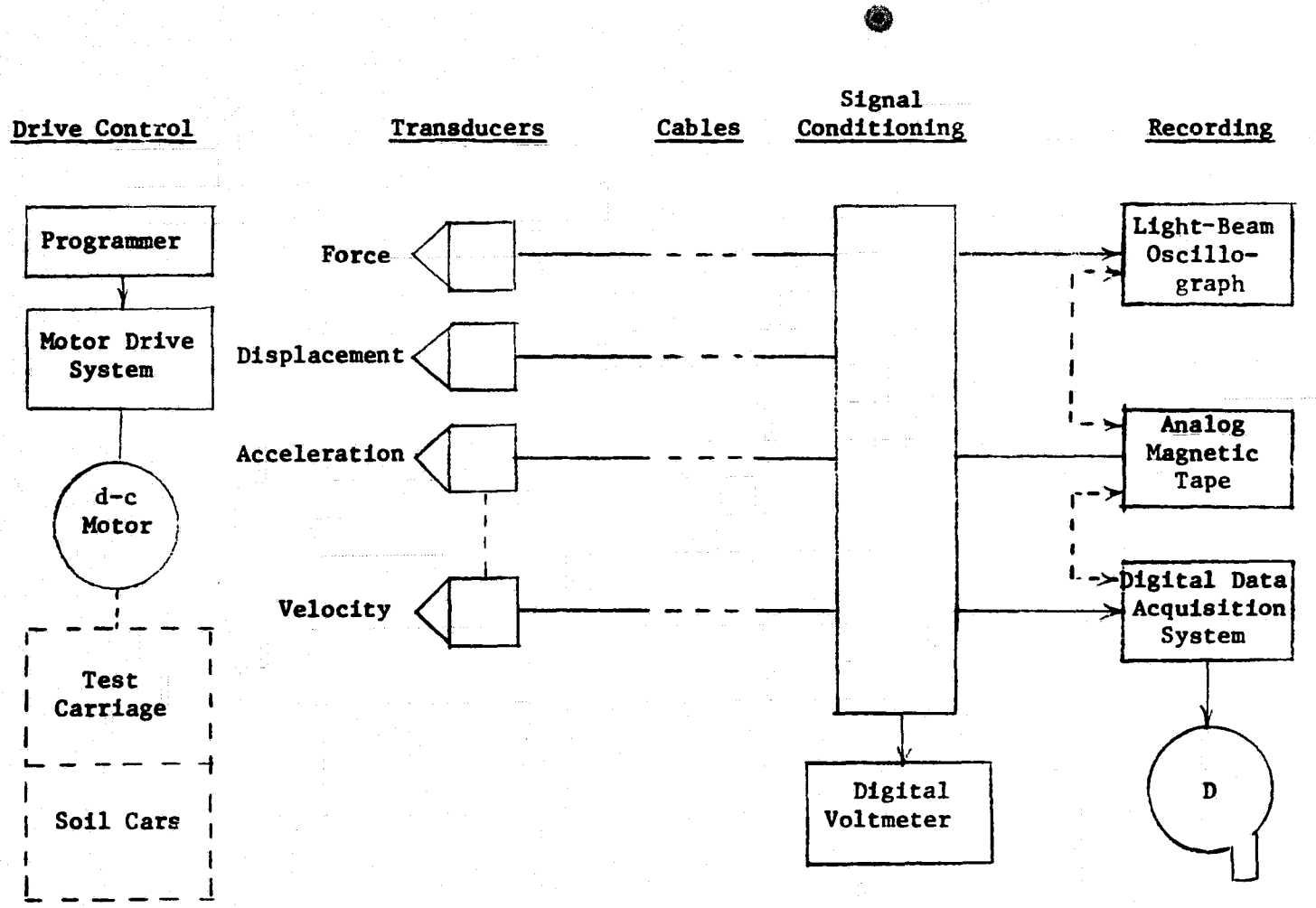


Fig. 4. Measurement and control system for mesh-wheel tests

PART III: TEST PROCEDURES

Calibrations

Transducer calibration

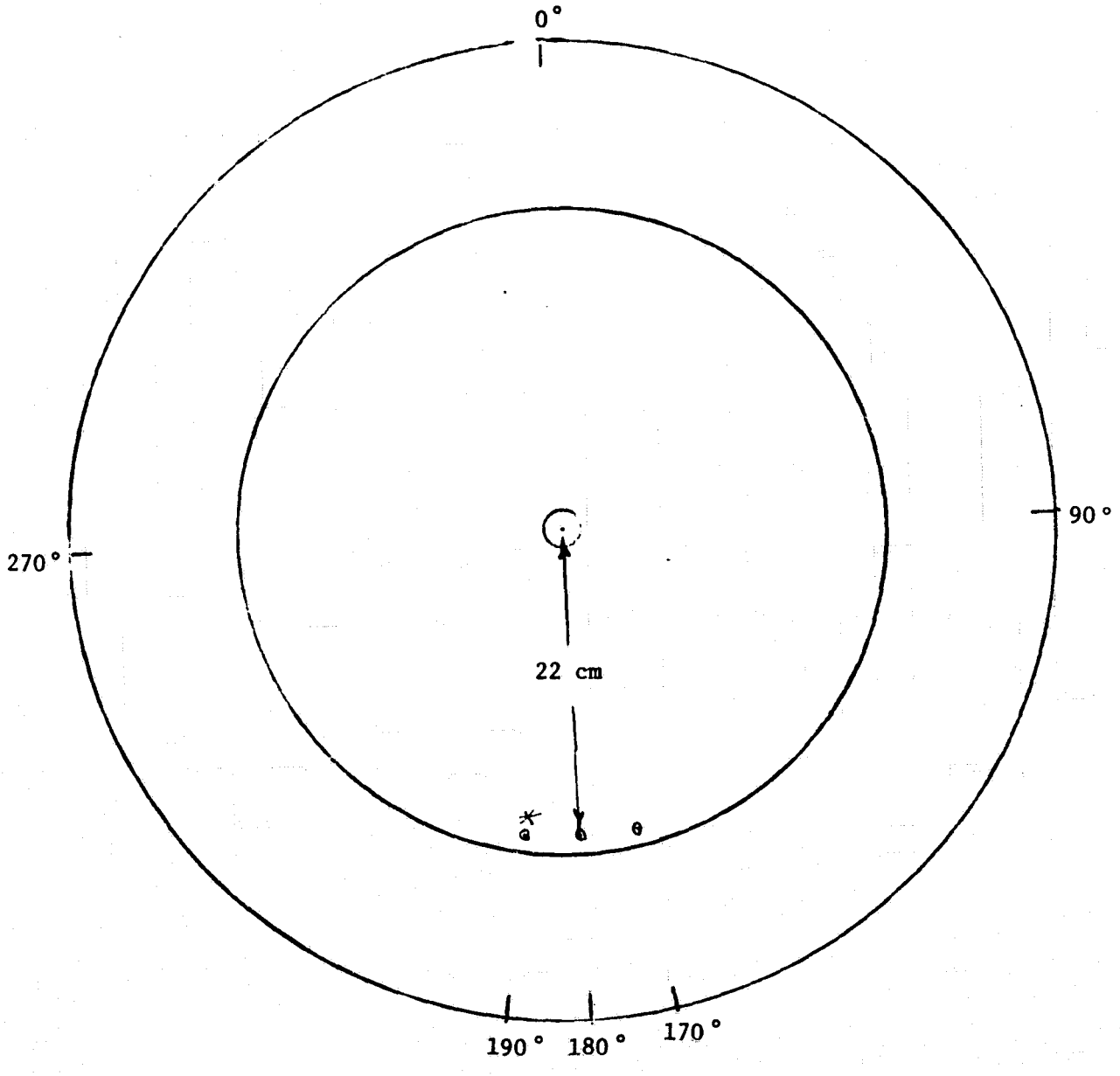
20. Commercial force cells and strain-gaged transducers fabricated at the WES were initially calibrated by using deadweights. The factory calibration of the accelerometer used was checked by inverting the instrument (i.e. a 2-g turnover).

In-place calibrations

21. After the dynamometer system was assembled, all transducers, extensiometers (for measuring displacements), and tachometers were calibrated. Forces were checked with a force cell used to apply load at various positions on the wheel and rim. Sinkage or tilt was checked by raising or lowering the test wheel a measured amount as indicated on an engineer's scale. Tachometers were checked against distance and time as given by the photoelectric cell interrupts and oscillograph timing lines. Such calibrations usually are performed prior to and at the end of each major test group, and, as such, are referred to as "end-to-end" calibrations.

Side-thrust calibration

22. Side thrust is the horizontal force S perpendicular to the plane of the wheel. To calibrate this thrust, a force was applied to the rim of the wheel at several radial points, as shown in fig. 5. In the initial calibration, the only radial position used was directly beneath the axle, and calibrations were conducted at only the 0-deg



*Force applied to the rim ≈22 cm from the center of the wheel.

Fig. 5. Calibration for side-thrust position.

yaw angle position. The calibration indicated that the measured side-thrust force averaged 3 percent less than the applied. This deviation was assumed to be due to the friction along the ball spline shaft that transferred force to the load cell. In the final calibration, a load was applied to the rim at six positions with the wheel at various yaw angles up to 45 deg. These six were 0, 90, 170, 180, 190, and 270 deg. In actual operation, the applied force should lie between 170 and 190 deg; therefore, an evaluation of system accuracy should be based on information obtained from calibrations made only at these points (see fig. 5). The measured side-thrust force averaged 8.5 percent less than the applied. A possible explanation of this deviation is that dust had settled on the ball spline shaft. It is postulated that these deviations between measured and applied forces for static conditions may represent the maximum that can occur, i.e. in the dynamic state, deviations caused by friction forces may be much less. For this reason, no attempt was made to use calibration data to adjust the recorded side-thrust measurements. True simulation of the dynamic state would have been a difficult, if not impossible, task to accomplish.

Pull calibration

23. Pull is the horizontal force B in the plane of the wheel; and since the wheel was operated only in the towed condition, this force was considered to be negative. The transducer reflecting this measurement was a strain-gaged thin section at the "kingpin" (the wheel's center of pivot and rotation) (see figs. 2 and 3). No deviations were noted between measured and applied forces when a force was applied in the plane of the wheel. However, since "mechanical cross talk" is often

a problem with this type of system, it was evaluated during calibration. To determine the magnitude of the cross talk, a force was applied perpendicular to the plane of the wheel at two different offsets from the axle and at up to six different radial positions. This calibration sequence was repeated at yaw angle positions of 0, 5, 10, 15, 25, and 40 deg. The calibration revealed that the cross talk was not sensitive to yaw angle position, but was very sensitive to the radial position at which the side thrust was applied. In the calibration, the radial position of the applied thrust was varied from 90 to 270 deg. The percentage of cross talk plotted as a function of the angle resembled a sine wave and crossed the abscissa near 180 deg. The percentage of cross talk could be approximated by a linear relation from 170 to 190 deg,* as shown in fig. 6. From visual observation of the tests, it appeared that the line of action of the side thrust was directly beneath the axle. Therefore, the force in the plane of the wheel was corrected as shown in the following example:

Measured B = -10 newtons

Measured S = 110 newtons

Read on fig. 6, 5 percent of S is registered as B at 180 deg.

B_c (corrected) = B - (0.05) (S)

$B_c = -10 - 5.5$

$B_c = -15.5$ newtons

Operational Procedures

24. The carriage was accelerated to the desired speed while traveling

*Refer to paragraph 22 for explanation of choice of 170 to 190 deg.

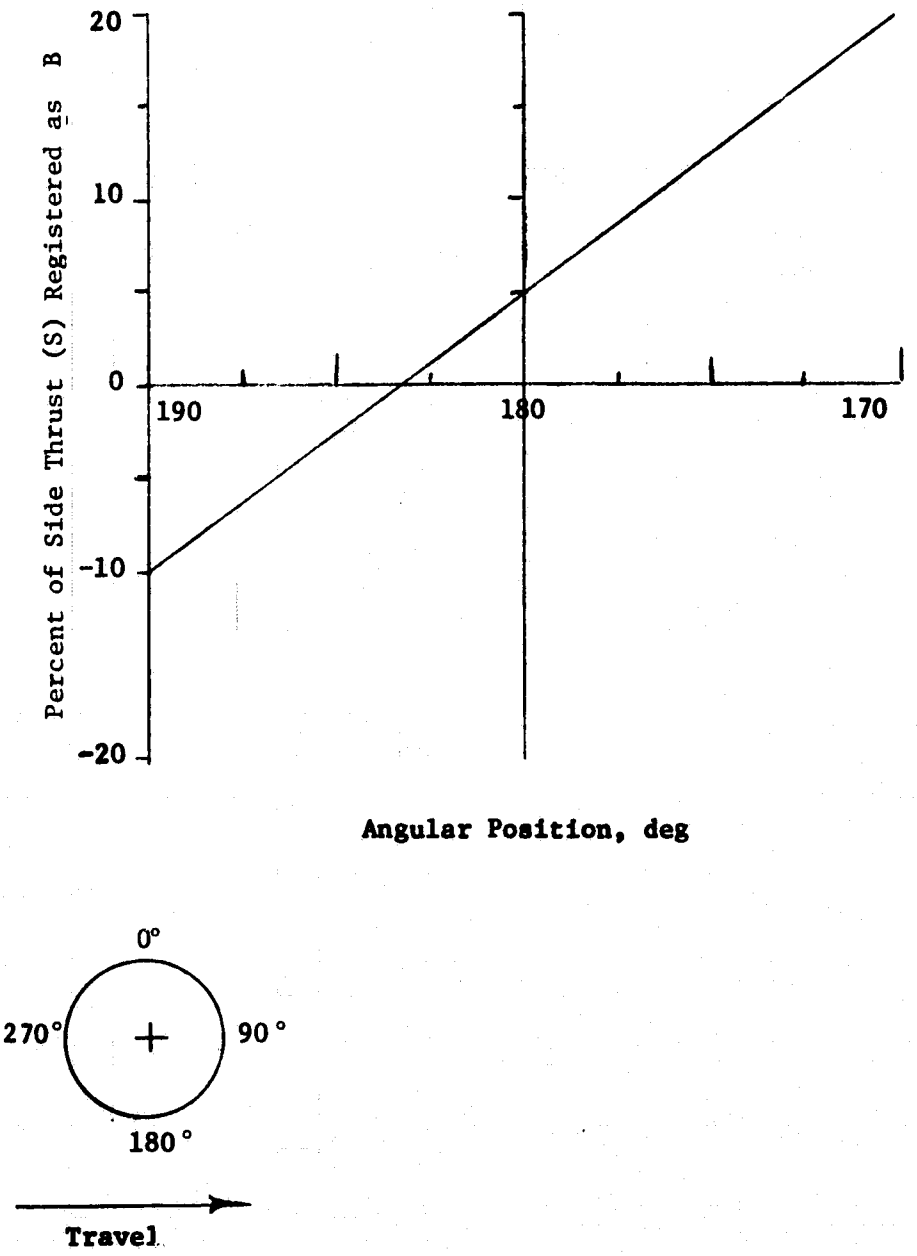


Fig. 6. Calibration for cross talk on side thrust S on pull (motion resistance) B

in an approach lane that was surfaced with a plastic-coated plywood. (Plywood was used in the approach lane to reduce the force on the wheel to a minimum before it reached the test lane and to eliminate the use of a second soil in the approach lane. If a second soil had been used, the wheel would have carried it forward and contaminated the LSS.) Once the desired velocity was attained, it was maintained as near constant as possible by the carriage servo-controlled speed system. Table 2 contains the statistical averages and standard deviations for the information shown in table 3. Table 3 contains a detailed computer listing of the parameters V_w , V_c , W , B , and S for tests 21, 22, 25, 26, and 30-48. The data are divided into three segments representing the approach, the test lane, and the overrun. The first one half to two thirds of the approach was on plastic-coated plywood surface and the remainder was a steady-state condition. The test lane represented a near steady-state condition and an area where the soil had the desired consistency. During the overrun the wheel was traveling on LSS of an unknown consistency.

Sign Conventions

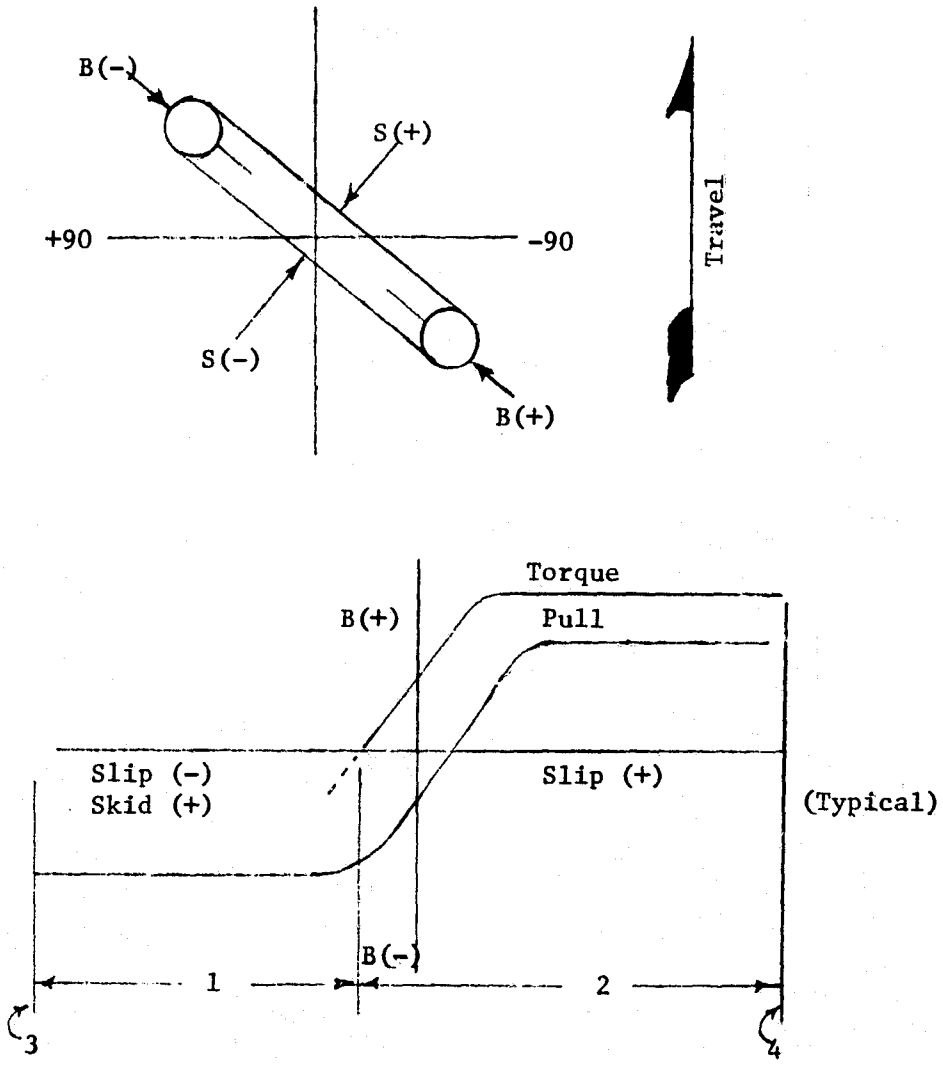
25. The sign conventions for yaw angle, side thrust, pull, sinkage, and slip and skid are given in fig. 7. In this study the slippage between the wheel and the surface is referred to as skid and is defined as follows:

$$\text{skid} = S = \left(\frac{V_w - V_c}{V_c}\right) 100 = \left(\frac{V_w}{V_c} - 1\right) 100$$

where

V_w = rotational speed of the wheel

V_c = translational speed of the carriage



LEGEND

1 Braked-or towed-wheel range
2 Powered-wheel range (not included in program)
3 Nonrotating wheel (full skid)
Slip = $-\infty$; Skid = 100%
4 Spinning wheel (stationary)
Slip = 100%

Fig. 7. Sign conventions

PART IV: TEST RESULTS

26. The principal control parameters for this program were speed, wheel load, and yaw angle. Soil conditions were approximately the same for each test. The effect that variation of these control parameters had on performance is described in the following paragraphs. Rut depth, skid, pull, and side thrust are the significant dependent performance parameters that were measured or computed from test results.

27. Wheel performance data are shown in tables 2 and 3. Table 2 also contains the corrected pull data, measured rut depth data, and the computed values of skid, pull coefficient, and side-thrust coefficient. The statistical averages shown in table 2 represent the average of the data from the test lane itself [~17.4 ft (~5 m) long]. Each data line shown in table 3 is 3.9 in. (10 cm) from its neighbor with respect to the test lane. The 1st to approximately the 50th data lines shown represent the performance on the plastic-coated plywood surface. No statistical summary nor data plots were made using these data. They are included in this report for information only, as requested by the Astronautics Laboratory. The wheel traveled approximately 3.3 ft (1 m) in the LSS before actually reaching the area referred to as "test lane."

Effect of Speed on Performance

28. The effect of varying carriage speed was examined at yaw angles of 0, 5, 10, and 25 deg. The wheel load for this group of tests was 62 lb (276 N), except for the 0-deg yaw angle tests; these were conducted at a load of 57 lb (253 N). The side-thrust coefficient and

sinkage decreased with speed for all yaw angles greater than zero, as shown in fig. 8. For the 0-deg yaw angle, the side thrust was negligible, and there was no significant change in sinkage with speed. The pull coefficient was not affected by speed in a consistent fashion. The information for the 0-deg angle tests is corroborated by data obtained with this wheel mounted in a different dynamometer system and run at speeds ranging from 2.5 to 10.9 ft/sec (0.75 to 3.3 m/sec).*

Effect of Wheel Load on Performance

29. The effect of wheel load on performance was examined at yaw angles of 5, 10, and 25 deg (fig. 9). The nominal speed for this group of tests was 4.5 ft/sec (1.37 m/sec). Pull coefficient decreased with load increase for 5- and 10-deg yaw angles. For the 25-deg angles, the pull coefficient generally increased with load. Side-thrust coefficient and sinkage tended to increase as the yaw angle, but did not exhibit a consistent trend with respect to load.

Effect of Yaw Angle on Performance

30. Inducing a yaw motion on a towed wheel affects the soil reaction forces, the skid or negative slip, and the amount of rutting or soil displacement that takes place.

Side-thrust coefficient

31. The relation of side-thrust coefficient to yaw angle for the overall test group is displayed in fig. 10. These data seem to indicate that the coefficient increased monotonically with respect

*Performance data from LRV test programs conducted at WES.

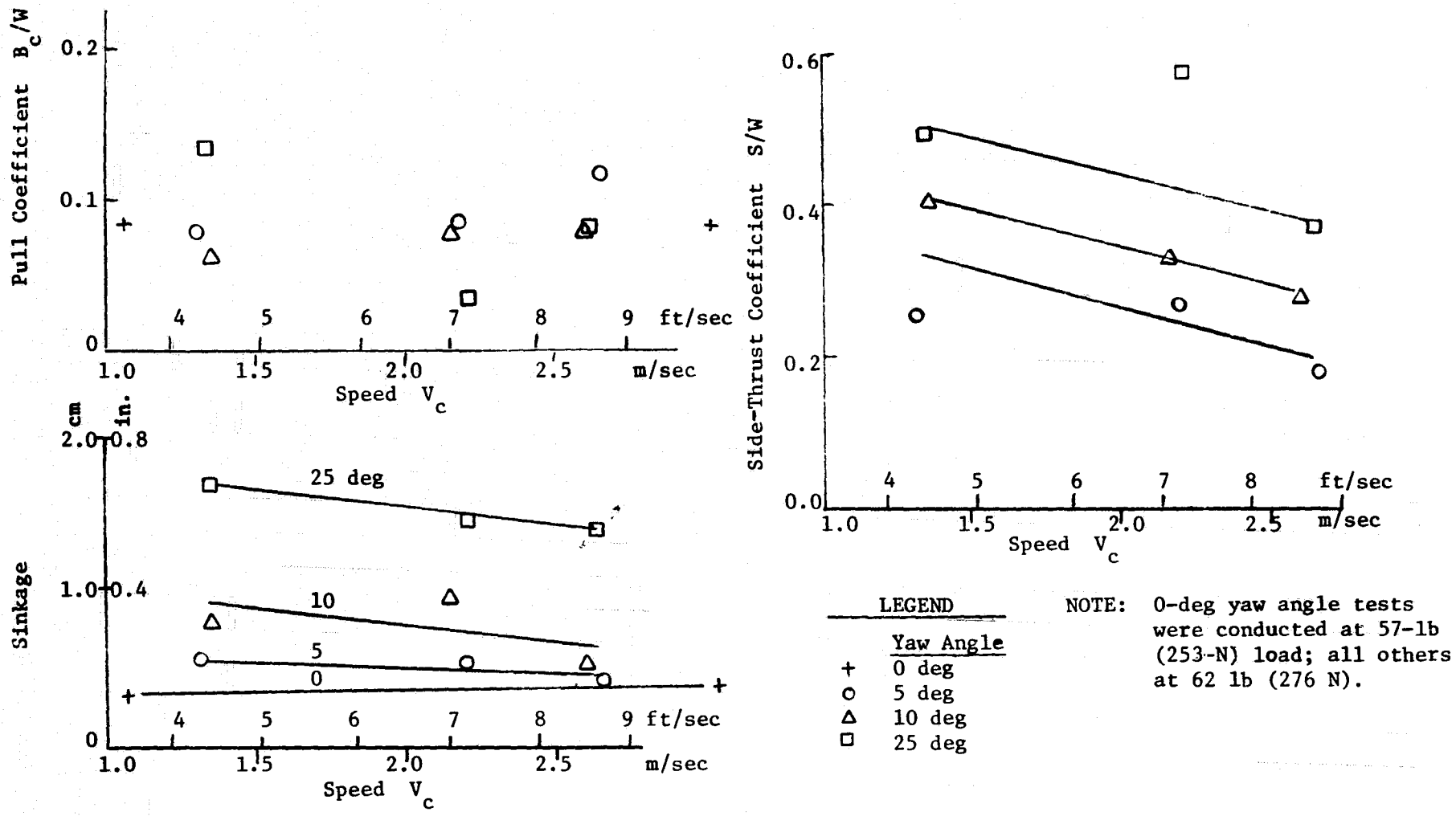
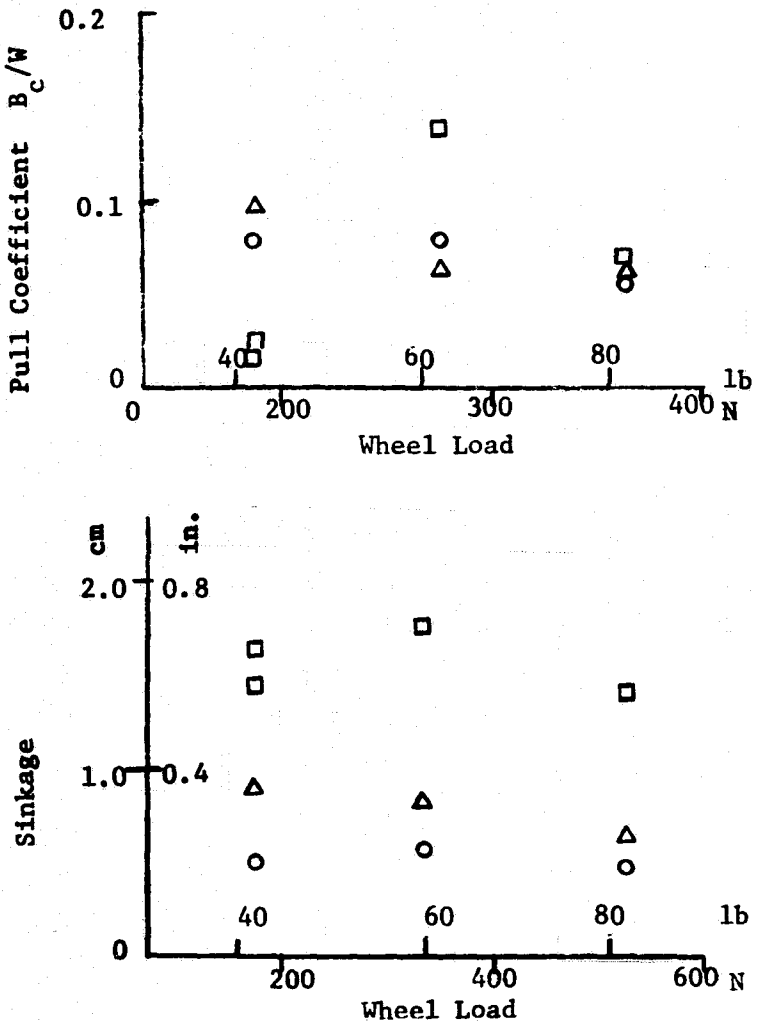
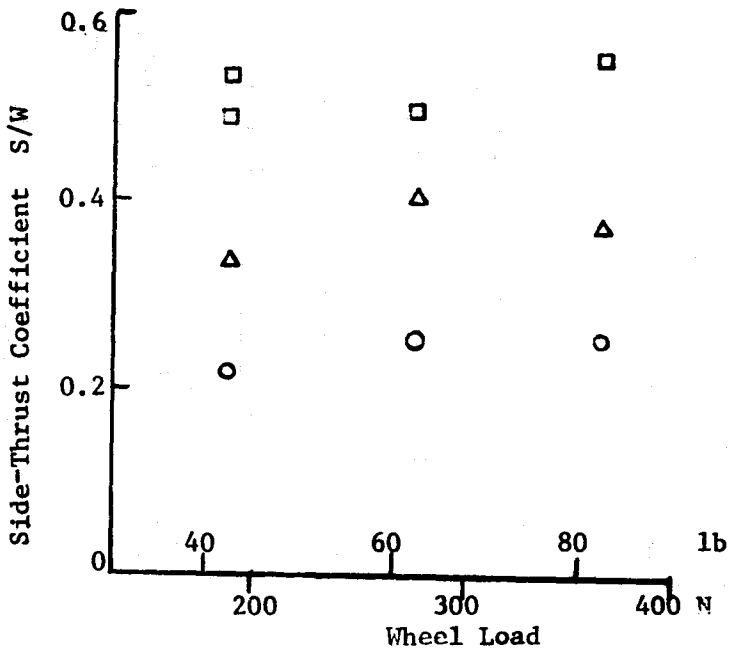


Fig. 8. Effect of speed on performance of 50% chevron-covered GM wheel; speed range 3.5-10.0 ft/sec (1.07-3.05 m/sec); $G \approx 3.7$ lb/in.^{2} ($\approx$1.0 MN/m^3)





LEGEND

	Yaw Angle
○	5 deg
△	10 deg
□	25 deg

Fig. 9. Effect of wheel load on performance of 50% chevron-covered GM wheel; load range 42-82 lb (187-365 N); nominal speed 4.5 ft/sec (1.37 m/sec)

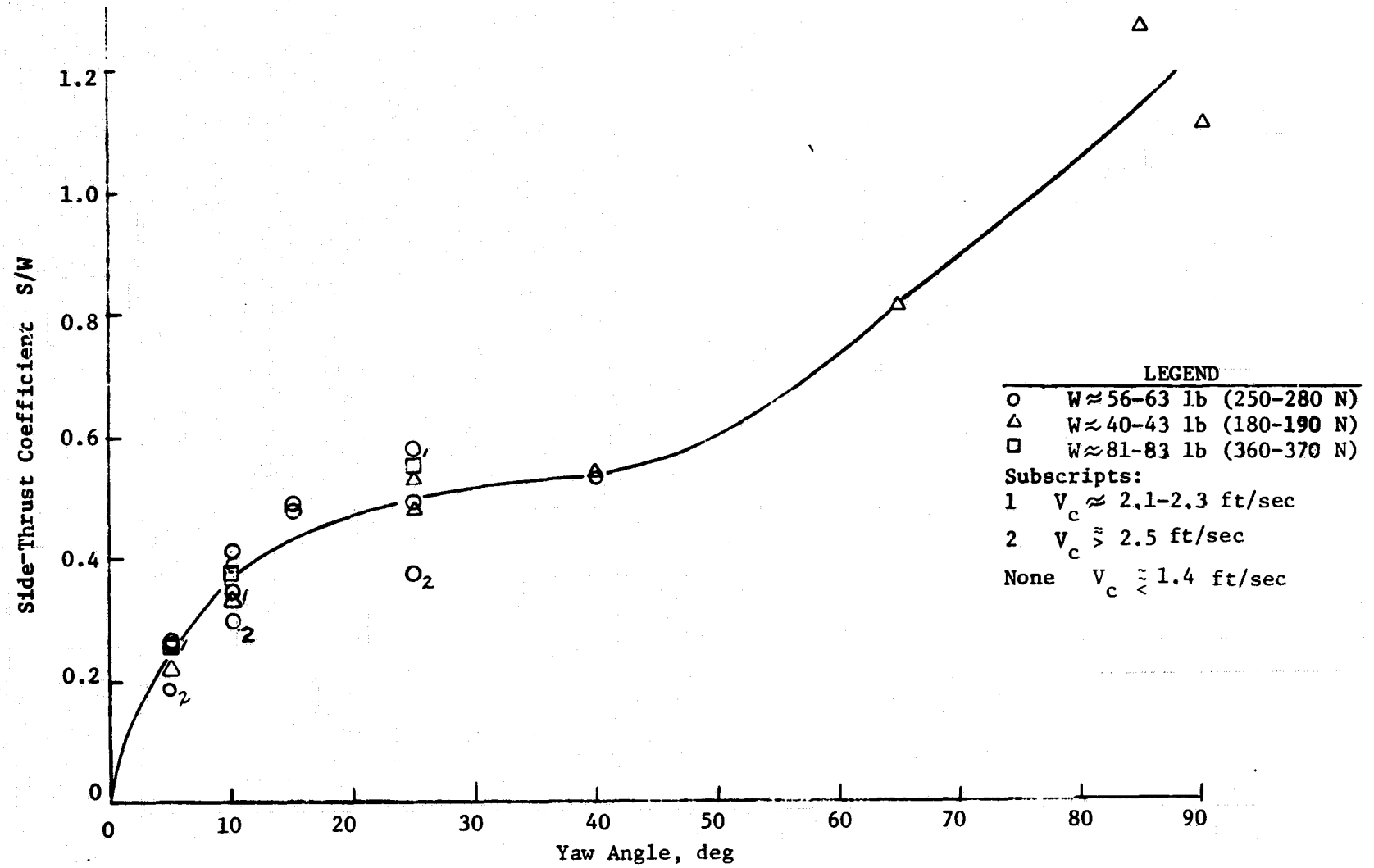


Fig. 10. Yaw angle versus side-thrust coefficient for the 50% chevron-covered GM wheel; load range 40-83 lb (180-370 N); speed range 3.5-10.0 ft/sec (1.07 to 3.05 m/sec)

to yaw angle in the range from 0 to 90 deg, and reached a value in excess of 1.0, i.e. side thrust became greater than wheel load. However, the scarcity of data in the range of 40 to 90 deg and the fact that the coefficient was 15 percent higher at 85 deg than at 90 deg suggest that the side-thrust coefficient may have reached a maximum at a yaw angle somewhere between 65 and 90 deg. An analysis of probable sources of error was made for the 85- to 90-deg tests, but nothing was noted that might have made either test appear more or less valid than the other. A rigorous analytical solution to define the relation of the side-thrust coefficient to yaw angle cannot readily be made for this complex system. It can be stated, however, that the information that is available, combined with the logic that can be applied, does not seem to preclude the possibility of the existence of a peak value of side thrust at some yaw angle less than 90 deg.

Pull coefficient

32. The relation of the pull coefficient to yaw angles for the overall test group is shown in fig. 11. The pull coefficient for the 0-deg yaw tests in this group and from 0-deg yaw tests with this wheel in a second dynamometer system (all tests were conducted on LSS_4) averaged approximately 0.10. There appears to be a slight tendency for pull coefficient to decrease with increasing yaw angle, although the data scatter is so great that no definitive trend can be established.

Skid (negative slip) versus yaw angle

33. Past experience has indicated that all towed wheels operating in deforming soils experience some skidding. Skid, as shown in fig. 12, is based on the rotational speed of the wheel about its own axis and

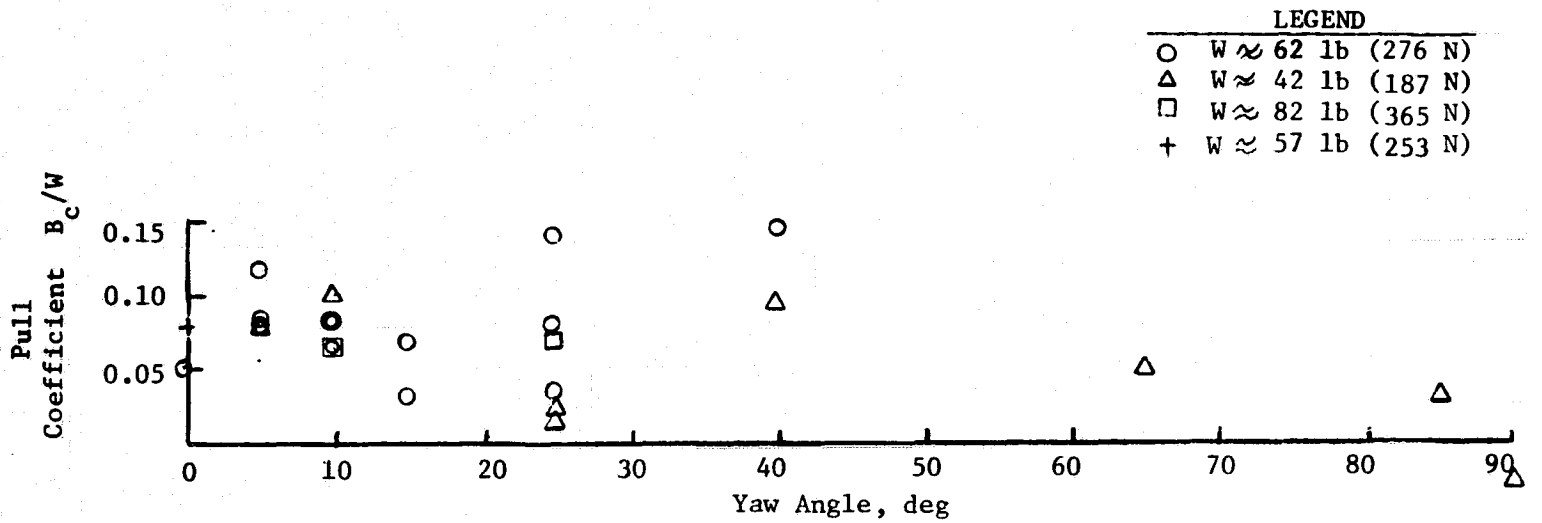


Fig. 11. Yaw angle versus pull coefficient for the 50% chevron-covered GM wheel; load range 42-82 lb (187-365 N); speed range 3.5-10.0 ft/sec (1.07-3.05 m/sec)

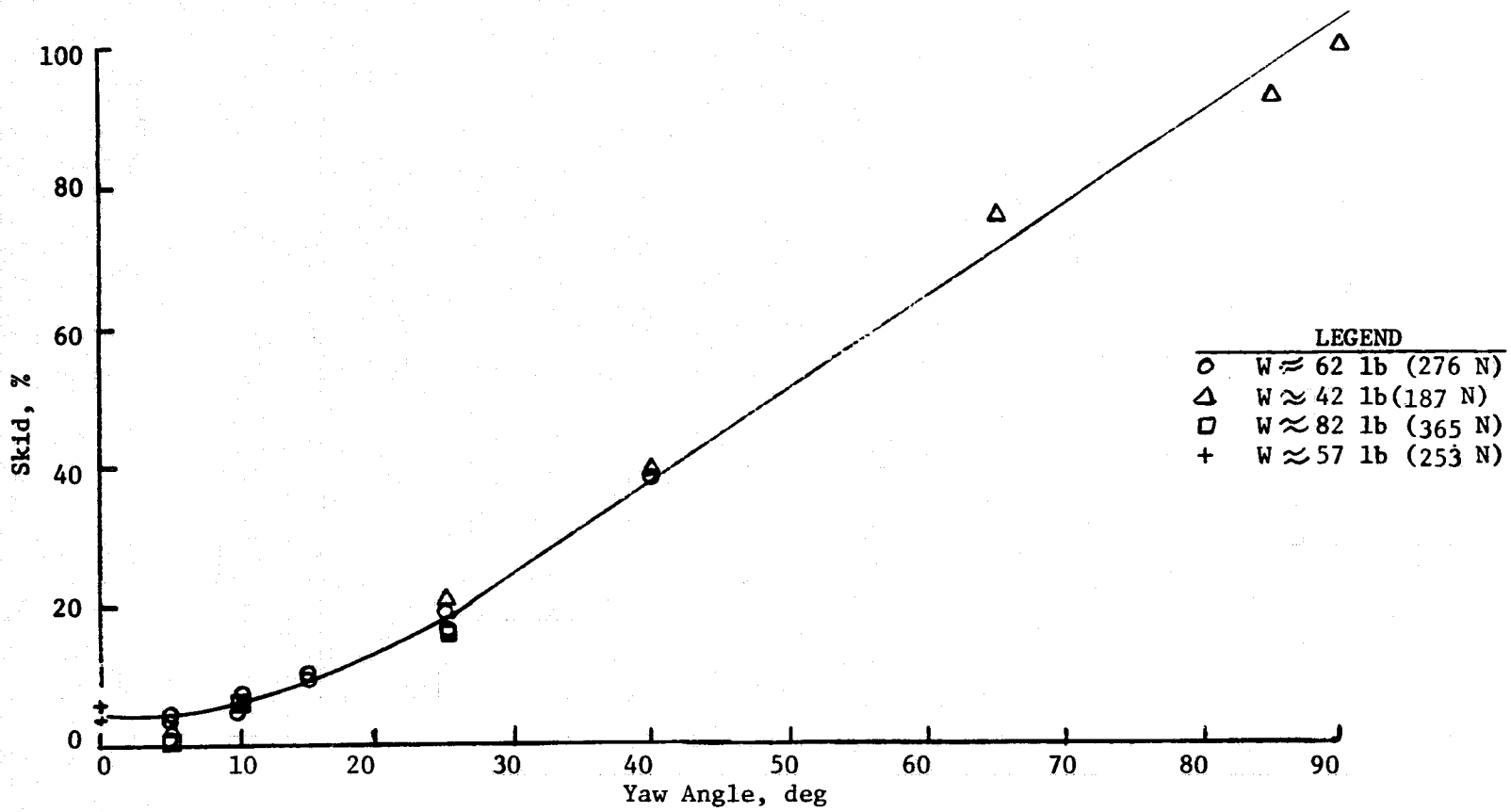


Fig. 12. Yaw angle versus skid for the 50% chevron-covered GM wheel; load range 42-82 lb (187-365 N); speed range 3.5-10.0 ft/sec (1.07-3.05 m/sec)

the speed of the carriage, i.e. no adjustment was made to account for the fact that the plane of rotation and plane of the direction of travel do not coincide. Fig. 12 shows that skid increased with yaw angle, and that the relation was not noticeably affected by speed or load.

Rut depth

34. Rut depth increased monotonically with yaw angle from 5 to 90 deg for the 42-lb (187-N) wheel load, as shown in fig. 13.

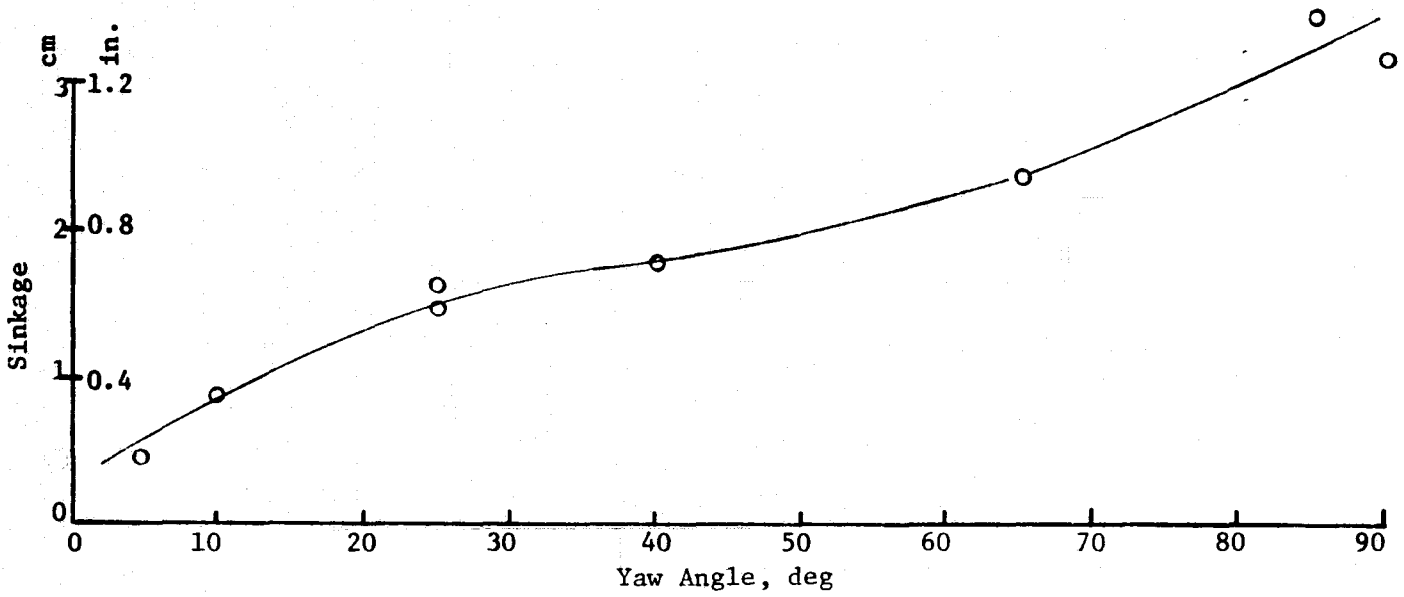


Fig. 13. Yaw angle versus sinkage for the 50% chevron-covered GM wheel; 42-lb (187-N) load; 4.5 ft/sec (1.37 m/sec) speed

PART V: CONCLUSIONS AND RECOMMENDATIONS

Conclusions

35. Based on the information presented herein, it is concluded that:

a. Speed has an effect on side-thrust coefficient and rut depth for yaw angles other than 0 deg.

b. The effect of wheel load on the side-thrust coefficient, the pull coefficient, and rut depth is not significant.

c. The side-thrust coefficient increases as the yaw angle, and the actual side-thrust force is higher than the static wheel load at yaw angles of 85 and 90 deg.

d. The pull coefficient is probably highest for the 0-deg yaw angle and decreases slightly as the yaw angle is increased.

e. The percentage of skid appears to be relatively independent of load and speed, and increases as the yaw angle in a near linear fashion.

Recommendations

36. It is recommended that:

a. The data obtained from this program be reviewed and used as a guide in the development of future test programs.

b. A future test program include additional towed-wheel tests conducted at yaw angles from 25 to 90 deg, and tests with driven and/or braked wheels conducted at various yaw angles.

c. An effort be made to increase the overall accuracy of the measuring systems.

Table 1

Wheel Data

Wheel Load		Measured Rolling Circumference*		Section Height Unloaded		Static Deflection at Vertical Axle		Wheel Diameter	
lb	N	m	in.	cm	in.	cm	in.	cm	in.
42	187	2.198	86.54	18.84	7.418	4.08	1.606	81.99	32.28
57	253	2.132	83.94	-	-	4.97	1.958	-	-
62	276	2.132	83.94	-	-	5.51	2.168	-	-
82	365	2.096	82.52	-	-	6.09	2.398	-	-

*Measured with towed wheel on unyielding surface.

Table 2

Wheel Performance Data Summary

Test No.	Yaw Angle deg	G MN/m^3	G pci	W, N Avg	W, N Std Dev	V_c, m/sec Avg	V_c, m/sec Std Dev	V_w, m/sec Avg	V_w, m/sec Std Dev	S, N Avg	S, N Std Dev	S/W	B, N Avg	B, N Std Dev	B_c N	B_c/W	Rut Depth in.	Rut Depth cm	Skid, % $\left(\frac{V_w}{V_c} - 1\right) 100$
21	0	1.07	3.97	254	1.9	1.06	.001	1.05	.005	--	--	--	-20.5	1.7	-20.5	.081	0.14	0.36	1.0
22	0	0.97	3.57	254	6.0	3.05	0	2.94	.034	--	--	--	-20.4	5.4	-20.4	.080	0.15	0.38	3.8
25	5	1.01	3.73	277	2.3	1.31	.007	1.31	.008	71.4	2.7	.258	-18.0	1.2	-21.6	.078	0.23	0.58	0
26	-5	1.08	3.98	277	2.8	1.32	.002	1.30	.006	-63.8	1.6	-.230	-32.3	1.5	-28.1	.101	0.22	0.56	1.5
27	10	0.89	3.48	276	17.0	1.35	--	1.29	--	113.0	6.0	.409	-11.2	6.0	-16.9	.061	0.32	0.81	4.4
28	15	1.02	3.75	276	12.0	1.33	--	1.22	--	134.8	9.8	.488	-1.4	7.5	-8.1	.029	0.18	0.46	8.3
29	25	1.00	3.68	277	10.0	1.34	--	1.12	--	157.5	6.5	.496	-30.0	5.0	-37.9	.137	0.69	1.75	16.4
30	40	1.02	3.75	274	9.0	1.30	--	0.80	--	144.8	8.8	.528	-32.0	9.7	-39.2	.143	0.77	1.96	38.5
31	5	0.97	3.56	189	4.8	1.32	.004	1.28	.008	41.5	2.5	.219	-12.2	1.3	-14.3	.076	0.19	0.48	3.0
32	10	1.25	4.60	190	4.2	1.33	.006	1.26	.011	63.7	4.4	.335	-15.2	2.3	-18.4	.097	0.35	0.89	5.3
33	25	1.06	3.90	186	0.5	1.31	.003	1.10	.014	99.2	5.8	.533	0.7	1.0	-4.3	.023	0.57	1.45	16.0
34	25	1.01	3.73	367	0.6	1.32	.008	1.12	.006	202.9	7.6	.553	-15.2	1.8	-25.3	.069	0.55	1.40	15.2
35	10	0.99	3.66	364	0.4	1.34	.004	1.27	.008	135.1	4.6	.371	-16.9	2.3	-21.6	.059	0.25	0.63	5.2
36	5	1.14	4.22	365	4.4	1.31	.005	1.30	.013	94.0	3.9	.257	-15.0	2.1	-19.7	.054	0.18	0.46	0.8
37	5	0.91	3.36	278	8.1	2.19	.034	2.10	.036	74.7	2.2	.269	-19.3	2.7	-23.0	.083	0.22	0.56	4.1
38	10	1.01	3.73	274	4.5	2.15	.023	2.03	.024	93.0	5.4	.339	-16.9	4.2	-21.5	.078	0.39	0.99	5.6
39	25	0.87	3.21	277	6.4	2.21	.024	1.85	.019	161.0	9.0	.581	-1.2	6.0	-9.2	.033	0.60	1.52	16.3
40	25	1.17	4.30	280	7.6	2.64	.023	2.15	.030	105.2	5.2	.375	-17.3	3.8	-22.3	.080	0.57	1.45	18.6
41	10	0.95	3.51	276	4.0	2.60	.019	2.46	.018	80.2	4.0	.290	-17.5	4.3	-21.5	.078	0.21	0.53	5.4
42	5	1.04	3.85	277	10.0	2.66	.020	2.56	.021	50.4	4.2	.182	-29.9	2.6	-32.4	.117	0.17	0.43	3.7
43	15	0.90	3.33	276	2.9	1.33	.008	1.23	.008	130.8	6.7	.474	-11.5	2.7	-18.0	.065	0.29	0.74	7.5
44	25	1.02	3.77	187	4.0	1.37	.007	1.09	.009	90.9	4.7	.486	1.4	1.3	-3.1	.016	0.64	1.63	20.4
45	40	1.05	3.88	188	8.5	1.33	0	0.83	.030	101.1	9.4	.538	-12.7	3.7	-17.8	.095	0.70	1.78	37.6
46	65	0.90	3.31	188	5.3	1.31	.006	0.31	.031	152.2	10.7	.809	-10.9	2.6	-18.5	.098	0.93	2.36	76.3
47	85	1.20	4.42	186	4.6	1.33	.009	0.10	.316	235.5	10.3	1.266	6.8	7.9	5.0	.027	1.18	2.99	92.5
48	90	0.96	3.55	185	1.2	1.31	.010	-0.03*	.007*	204.9	4.3	1.107	18.5	3.1	8.0	(-.043)	1.05	2.67	100.0*

*V_w assumed zero based on photographic evidence.

Table 3

Detailed Computer Listing of Performance Parameters

Test No. 21; 0-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	1.053	1.028	246.4	-5.2	12.8
	1.058	1.034	247.4	-5.4	12.5
	1.061	1.040	253.0	-6.6	11.4
	1.053	1.046	249.2	-6.8	9.2
	1.055	1.043	244.6	-4.7	7.4
	1.057	1.051	246.6	-4.6	7.7
	1.062	1.052	253.7	-4.3	8.7
	1.064	1.052	251.8	-1.9	9.9
	1.063	1.051	249.8	-.4	11.5
	1.071	1.051	253.4	-2.0	11.9
	1.073	1.051	258.0	-2.0	11.3
	1.073	1.053	255.3	-2.3	9.9
	1.071	1.053	253.0	-2.7	8.8
	1.070	1.054	253.7	-3.3	7.9
	1.070	1.053	256.0	-3.6	7.0
	1.068	1.053	257.4	-4.7	5.7
	1.065	1.051	253.4	-4.3	6.1
	1.064	1.051	251.7	-5.2	7.0
	1.064	1.053	252.5	-4.3	7.7
	1.065	1.055	252.9	-4.1	7.7
	1.063	1.055	250.6	-3.0	7.7
	1.061	1.054	250.2	-3.3	7.2
	1.061	1.054	254.1	-2.3	6.3
	1.062	1.054	257.6	-3.6	4.9
	1.060	1.054	258.7	-4.3	3.6
	1.056	1.054	254.5	-2.7	4.1
	1.053	1.055	251.8	-1.1	5.3
	1.054	1.055	255.7	-2.2	6.6
	1.064	1.053	257.0	-1.4	7.9
	1.058	1.051	248.6	-1.2	10.1
	1.059	1.051	246.5	-4.6	11.0
	1.056	1.053	253.8	-7.8	9.9
	1.050	1.053	255.6	-8.2	8.0
	1.049	1.054	252.7	-10.1	7.1
	1.053	1.053	254.9	-12.1	5.9
	1.053	1.053	260.1	-11.9	4.6
	1.053	1.052	258.3	-11.3	3.8
	1.052	1.052	249.9	-11.3	3.3
	1.049	1.052	248.0	-12.2	2.3
	1.047	1.054	253.2	-12.2	1.8
	1.043	1.054	255.3	-14.6	.7
	1.049	1.054	254.4	-17.6	.0
	1.049	1.055	256.4	-20.0	0.0
	1.053	1.058	257.9	-21.0	.2
	1.057	1.058	256.7	-19.7	-.3
	1.057	1.059	256.8	-19.1	.0
	1.055	1.060	254.5	-18.1	.4
	1.053	1.060	250.2	-16.4	1.3
	1.056	1.059	249.4	-15.4	2.3
	1.058	1.059	252.6	-17.5	3.0
	1.060	1.059	253.2	-17.2	4.3
	1.064	1.059	252.3	-17.2	5.8
	1.065	1.058	254.5	-17.5	6.4
	1.062	1.057	255.8	-18.0	6.3
	1.059	1.057	256.0	-18.3	6.3
	1.056	1.057	256.0	-19.2	6.0
	1.053	1.057	255.8	-19.2	5.4
	1.053	1.057	255.1	-19.7	4.4
	1.050	1.059	256.1	-20.2	4.1
	1.049	1.059	255.2	-20.0	4.0
Test Lane	1.049	1.057	252.1	-19.7	3.5
	1.049	1.056	251.2	-19.1	3.8
	1.047	1.057	252.7	-18.9	3.6
	1.049	1.057	253.3	-18.9	3.7
	1.048	1.055	253.6	-19.4	3.5
	1.047	1.055	254.9	-19.5	3.9
	1.048	1.056	256.4	-19.5	3.8
	1.045	1.055	257.9	-20.7	4.1
	1.040	1.054	254.7	-20.7	4.1
	1.038	1.055	249.0	-19.2	4.7
	1.040	1.056	247.6	-19.1	5.4
	1.041	1.057	251.0	-20.0	5.6
	1.043	1.057	252.5	-19.7	6.5
	1.047	1.057	253.7	-20.2	7.0
	1.051	1.057	255.0	-20.2	7.2
	1.051	1.057	255.3	-19.5	6.6
	1.051	1.057	254.4	-19.2	6.2
	1.052	1.059	254.0	-19.2	5.1
	1.051	1.060	255.5	-18.7	4.9
	1.050	1.061	256.0	-20.2	4.4
	1.050	1.060	256.0	-20.8	3.9
	1.049	1.060	255.6	-21.1	3.8
	1.049	1.060	254.2	-21.5	3.9
	1.050	1.062	252.2	-21.0	4.2
	1.048	1.060	253.3	-20.7	3.9
	1.047	1.060	253.8	-20.2	3.9
	1.045	1.061	252.9	-19.9	3.4
	1.045	1.061	253.2	-19.4	3.5
	1.045	1.060	254.7	-20.0	2.8
	1.042	1.060	256.5	-21.0	2.3
	1.039	1.060	255.3	-21.5	1.8
	1.040	1.061	250.9	-20.8	2.5
	1.042	1.060	249.5	-20.3	3.3
	1.045	1.059	252.6	-20.3	3.6
	1.049	1.059	253.5	-20.0	4.7
	1.052	1.059	254.7	-20.7	5.7
	1.053	1.057	256.6	-21.3	6.5
	1.053	1.056	257.0	-21.8	5.8
	1.052	1.057	255.7	-22.1	5.5
	1.051	1.057	255.1	-22.7	4.6
	1.051	1.056	253.5	-23.1	4.3
	1.051	1.056	253.2	-23.1	3.3
	1.051	1.057	253.6	-23.5	3.0
	1.051	1.057	254.0	-23.5	3.3
	1.049	1.055	252.7	-23.5	3.9
	1.049	1.055	251.1	-22.6	4.4
	1.047	1.057	252.9	-23.5	4.5
	1.046	1.058	255.2	-24.2	4.5
	1.046	1.058	254.0	-24.2	4.2
	1.047	1.060	252.5	-23.8	3.9
	1.048	1.062	254.4	-24.8	2.7
	1.047	1.064	255.9	-25.3	2.3
	1.045	1.063	252.8	-24.5	2.6
	1.046	1.063	247.9	-23.5	2.3
	1.049	1.063	247.9	-23.5	2.6
	1.051	1.063	252.1	-25.1	3.0
	1.054	1.061	255.6	-26.2	3.7
	1.061	1.060	260.5	-29.9	3.8
	1.068	1.060	263.9	-32.4	4.4
Overrun	1.070	1.060	261.4	-31.3	4.0

(Continued)

Table 3 (Continued)

Test No. 22 ; 0-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	2.902	1.968	310.4	-6.5	-4.2
	3.108	1.968	312.7	-3.0	-3.6
	3.109	1.968	292.8	1.1	-4.4
	3.038	1.968	262.1	3.8	-6.0
	3.045	1.968	224.2	7.3	-6.0
	2.992	1.968	195.1	8.0	-6.6
	2.944	1.968	177.6	6.1	-5.7
	2.904	1.968	171.5	3.6	-5.3
	2.881	1.968	136.5	.8	-4.7
	2.887	1.968	221.1	-3.2	-5.9
	2.911	1.968	263.4	-5.7	-5.4
	2.950	1.968	300.9	-5.4	-4.9
	2.993	1.968	332.1	-6.2	-3.7
	3.047	1.968	339.3	-3.3	-2.2
	3.075	1.968	321.1	-.9	-.4
	3.079	1.968	290.9	2.0	.2
	3.033	1.968	257.6	2.0	.0
	3.028	1.968	224.7	4.1	-.5
	2.985	1.968	205.6	2.5	-1.1
	2.951	1.968	201.5	2.2	-1.0
	2.932	1.968	204.7	.8	-1.0
	2.929	1.968	220.4	-.3	-2.0
	2.944	1.968	247.2	-3.2	-3.2
	2.970	1.968	273.8	-3.3	-3.7
	2.999	1.968	292.2	-1.9	-4.1
	3.018	1.968	303.5	.3	-4.1
	3.023	1.968	296.1	1.4	-3.1
	3.011	1.968	275.6	2.2	-3.0
	2.931	1.968	253.3	2.2	-3.3
	2.941	1.968	233.0	-.4	-4.3
	2.907	1.968	218.9	-4.8	-6.0
	2.885	1.968	222.4	-6.7	-7.8
	2.873	1.968	236.8	-7.7	-7.8
	2.877	1.968	244.3	-8.6	-7.9
	2.894	1.968	253.0	-9.1	-7.9
	2.920	1.968	261.7	-8.6	-7.8
	2.941	1.968	263.3	-8.5	-7.7
	2.955	1.968	257.5	-8.5	-7.4
	2.954	1.968	257.7	-9.3	-7.4
	2.967	1.968	260.2	-9.1	-5.5
	2.963	1.968	258.8	-8.8	-4.2
	2.958	1.968	259.7	-7.5	-2.6
	2.956	1.968	262.5	-7.5	-2.8
	2.953	1.968	262.0	-7.0	-3.3
	2.951	1.968	257.7	-7.0	-4.0
	2.949	1.968	256.7	-7.5	-4.3
	2.943	1.968	254.6	-10.4	-3.8
	2.946	1.968	249.9	-10.9	-2.4
	2.946	1.968	248.8	-12.3	-.5
	2.943	1.968	249.6	-13.9	-.8
	2.949	1.968	249.7	-17.1	-1.7
	2.953	1.968	249.6	-17.8	-2.3
	2.961	1.968	255.4	-18.4	-2.4
	2.970	1.968	258.9	-17.5	-2.4
	2.975	1.968	260.4	-16.7	-2.1
	2.981	1.968	259.1	-14.7	-.8
	2.988	1.968	256.0	-12.6	-.3
	2.993	1.968	248.8	-12.0	-.2
	2.991	1.968	245.3	-12.0	-.4
	2.987	1.968	246.3	-13.6	-.2
Test Lane	2.935	1.968	247.1	-12.2	-.1
	2.931	1.968	250.7	-13.3	.1
	2.979	1.968	256.8	-13.3	.1
	2.979	1.968	259.9	-14.4	-.2
	2.979	1.968	259.0	-13.6	-.5
	2.979	1.968	261.9	-16.3	-1.1
	2.979	1.968	262.7	-17.0	-1.4
	2.975	1.968	259.8	-19.2	-1.9
	2.969	1.968	258.0	-19.4	-1.1
	2.964	1.968	256.8	-20.4	-.8
	2.959	1.968	252.1	-19.7	-.8
	2.953	1.968	247.9	-20.0	-1.6
	2.945	1.968	247.1	-18.8	-1.7
	2.938	1.968	243.4	-17.9	-2.1
	2.930	1.968	242.1	-17.3	-3.2
	2.924	1.968	245.5	-18.3	-3.4
	2.919	1.968	248.8	-17.3	-2.6
	2.915	1.968	248.6	-17.3	-1.1
	2.925	1.968	251.5	-17.9	-.7
	2.933	1.968	254.8	-17.9	.3
	2.938	1.968	252.4	-16.3	1.0
	2.940	1.968	253.6	-18.3	1.1
	2.943	1.968	257.0	-18.3	.1
	2.940	1.968	260.1	-18.9	-1.1
	2.938	1.968	260.3	-19.7	-2.1
	2.937	1.968	265.1	-21.3	-2.5
	2.936	1.968	263.5	-20.4	-2.5
	2.931	1.968	259.6	-23.3	-2.8
	2.928	1.968	256.3	-22.6	-1.7
	2.920	1.968	252.9	-23.4	-.7
	2.911	1.968	248.6	-22.1	.0
	2.904	1.968	245.0	-23.4	-.0
	2.900	1.968	247.4	-21.8	.2
	2.895	1.968	245.7	-23.1	-.9
	2.891	1.968	246.6	-22.1	-1.8
	2.887	1.968	246.7	-25.2	-3.1
	2.884	1.968	250.3	-24.5	-3.4
	2.883	1.968	250.1	-24.9	-2.8
	2.879	1.968	253.4	-25.2	-1.9
	2.881	1.968	254.1	-26.0	-1.0
	2.885	1.968	252.3	-24.9	.5
	2.890	1.968	251.9	-25.8	1.4
	2.895	1.968	251.7	-27.1	1.1
	2.899	1.968	252.4	-27.7	.8
	2.901	1.968	255.0	-29.4	.8
	2.902	1.968	261.1	-30.0	.2
	2.904	1.968	263.4	-31.1	-.2
	2.904	1.968	264.5	-32.1	-1.6
	2.903	1.968	264.2	-33.4	-1.7
	2.902	1.968	262.4	-34.8	-2.0
	2.902	1.968	259.4	-35.8	-.5
Overrun	2.903	1.968	259.9	-36.9	-.4
	2.909	1.968	263.1	-35.9	1.8
	2.916	1.968	262.6	-33.1	2.9
	2.924	1.968	262.3	-31.4	3.2
	2.932	1.968	260.7	-27.3	1.3
	2.936	1.968	251.8	-22.0	.6
	2.933	1.968	230.2	-14.7	.1
	2.919	1.968	203.2	-6.7	-.4
	2.898	1.968	173.4	-.6	-.5

(Continued)

Table 3 (Continued)

Test No. 25 ; 5 -deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	1.272	1.254	271.5	21.3	110.8
	1.287	1.266	278.3	20.9	113.1
	1.301	1.280	276.9	20.1	113.1
	1.314	1.289	277.4	20.2	114.0
	1.320	1.295	276.4	20.5	114.0
	1.323	1.297	271.5	20.5	112.8
	1.320	1.296	269.7	22.0	113.8
	1.318	1.296	270.8	22.8	114.3
	1.315	1.296	272.0	22.1	116.5
	1.314	1.295	275.5	22.0	115.8
	1.312	1.296	277.9	21.2	115.2
	1.311	1.297	279.0	20.9	113.3
	1.313	1.300	277.9	19.3	113.0
	1.313	1.301	277.7	20.4	111.6
	1.318	1.302	280.4	20.4	112.8
	1.315	1.302	279.5	20.9	115.2
	1.315	1.300	273.6	21.7	114.7
	1.317	1.293	269.2	21.7	109.9
	1.321	1.297	275.5	21.7	108.4
	1.327	1.299	278.6	21.7	109.1
	1.338	1.302	281.2	21.8	108.2
	1.342	1.305	278.9	20.4	106.4
	1.341	1.305	278.3	20.9	108.1
	1.337	1.305	277.4	19.6	107.9
	1.331	1.304	277.1	20.1	109.1
	1.327	1.301	274.7	20.5	110.1
	1.326	1.300	277.0	21.2	112.5
	1.326	1.301	279.6	21.7	114.5
	1.324	1.303	277.7	22.8	116.7
	1.324	1.304	272.8	21.8	116.7
	1.322	1.304	270.4	21.7	119.6
	1.322	1.305	273.5	21.0	123.1
	1.321	1.304	276.6	20.1	125.5
	1.322	1.302	279.6	18.0	128.9
	1.326	1.302	280.9	13.5	133.9
	1.327	1.303	283.7	18.2	136.1
	1.324	1.303	280.6	18.3	137.1
	1.321	1.303	272.0	17.9	137.1
	1.323	1.304	264.0	18.0	135.9
	1.326	1.305	270.2	15.9	132.4
	1.330	1.305	280.5	15.2	133.7
	1.337	1.306	283.0	15.6	138.5
	1.340	1.306	281.1	16.3	141.5
	1.337	1.308	278.9	15.5	141.2
	1.333	1.310	275.0	16.4	140.5
	1.330	1.311	273.9	14.7	137.8
	1.328	1.313	277.5	13.6	134.9
	1.329	1.314	279.4	12.5	133.6
	1.329	1.315	280.5	12.3	133.4
	1.321	1.313	275.6	8.3	130.7
	1.312	1.312	269.9	4.7	122.8
	1.305	1.312	270.7	-1.2	111.1
	1.304	1.312	277.2	-6.4	98.9
	1.302	1.311	280.2	-12.3	86.8
	1.301	1.311	280.5	-15.5	76.8
	1.301	1.312	280.1	-16.4	73.8
	1.301	1.311	278.9	-17.1	71.6
	1.295	1.310	278.8	-18.5	70.1
	1.293	1.311	276.7	-17.4	70.2
	1.295	1.313	273.2	-16.7	71.2
Test Lane	1.303	1.313	272.0	-16.7	70.4
	1.306	1.313	273.9	-16.7	71.2
	1.309	1.313	275.6	-16.1	73.1
	1.311	1.311	278.6	-17.1	74.3
	1.314	1.311	281.6	-16.1	75.6
	1.314	1.310	280.1	-16.1	76.8
	1.314	1.311	277.1	-15.5	77.5
	1.313	1.313	274.9	-15.5	77.2
	1.310	1.313	274.1	-15.3	77.0
	1.309	1.312	275.1	-16.1	76.3
	1.307	1.311	277.1	-16.7	74.3
	1.303	1.312	277.9	-17.4	73.1
	1.306	1.312	276.5	-17.2	71.9
	1.311	1.312	275.3	-16.6	71.2
	1.313	1.314	275.6	-18.0	69.9
	1.314	1.317	277.9	-17.4	70.4
	1.311	1.318	278.2	-18.0	69.9
	1.311	1.319	278.0	-18.8	69.4
	1.311	1.320	273.7	-19.6	68.4
	1.309	1.322	279.7	-19.6	68.0
	1.307	1.322	276.1	-19.9	67.9
	1.310	1.320	271.8	-18.5	69.6
	1.317	1.320	272.2	-18.3	71.2
	1.318	1.320	276.1	-18.2	72.1
	1.320	1.319	278.3	-17.7	73.8
	1.322	1.316	280.9	-18.6	75.1
	1.324	1.315	280.1	-18.6	75.1
	1.320	1.313	277.4	-17.4	73.6
	1.314	1.307	275.4	-18.0	72.9
	1.305	1.301	274.1	-17.7	71.6
	1.299	1.296	273.5	-17.7	70.2
	1.293	1.292	277.0	-18.3	68.9
	1.289	1.291	279.4	-19.1	68.9
	1.288	1.292	277.5	-18.5	69.0
	1.293	1.296	275.8	-19.0	69.0
	1.297	1.301	276.1	-18.2	70.4
	1.301	1.306	277.2	-18.8	70.4
	1.305	1.309	278.3	-18.8	70.2
	1.305	1.312	278.3	-19.4	69.2
	1.305	1.313	276.9	-19.1	68.9
	1.306	1.312	277.7	-20.1	67.2
	1.305	1.310	278.2	-20.2	66.8
	1.302	1.310	274.8	-20.2	67.2
	1.305	1.311	272.5	-18.6	68.9
	1.309	1.311	274.0	-19.0	69.7
	1.311	1.311	276.4	-18.2	70.1
	1.314	1.312	277.4	-18.6	71.1
	1.318	1.313	279.7	-19.0	70.7
	1.322	1.313	280.6	-19.3	71.4
	1.321	1.313	279.0	-18.3	72.3
	1.321	1.315	275.9	-19.0	73.6
Overrun	1.318	1.317	273.9	-17.1	75.1
	1.314	1.317	273.8	-16.7	77.2
	1.311	1.315	275.6	-16.4	76.5
	1.311	1.315	277.2	-17.1	75.0
	1.313	1.316	277.0	-15.2	75.3
	1.310	1.314	274.6	-14.4	75.3
	1.310	1.314	269.9	-11.2	77.7
	1.309	1.315	267.0	-9.6	82.7
	1.308	1.317	269.9	-7.1	90.2

(Continued)

Table 3 (Continued)

Test No. 30; 40-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	.367	1.214	275.0	2.3	56.2
	.371	1.233	274.5	7.3	36.4
	.363	1.248	274.6	16.6	30.4
	.381	1.262	274.8	13.3	23.8
	.374	1.269	274.4	.7	17.9
	.366	1.275	274.3	-4.0	21.6
	.361	1.273	274.5	9.4	34.6
	.365	1.275	274.2	4.3	31.4
	.356	1.279	274.6	-3.4	40.0
	.363	1.279	274.4	.9	51.6
	.339	1.277	274.3	3.9	59.1
	.920	1.277	274.3	-4.3	69.0
	.926	1.231	274.3	-2.8	72.3
	.934	1.278	274.7	3.1	67.4
	.941	1.279	274.8	2.7	71.9
	.936	1.281	274.6	.4	80.9
	.933	1.285	275.6	4.9	82.6
	.940	1.284	275.6	2.5	79.2
	.933	1.285	275.5	6.4	30.2
	.941	1.288	275.9	1.6	83.7
	.937	1.288	275.6	-1.9	33.9
	.926	1.285	274.6	7.6	71.2
	.923	1.281	275.2	3.1	70.1
	.925	1.279	274.2	6.9	72.4
	.935	1.273	274.8	12.3	76.1
	.935	1.233	275.0	-2.1	75.6
	.926	1.233	275.3	-6.7	72.3
	.915	1.233	275.4	4.0	67.7
	.913	1.234	275.4	-15.6	77.0
	.905	1.231	274.9	-14.7	39.5
	.900	1.232	274.9	6.6	92.2
	.903	1.281	274.4	-2.7	113.5
	.913	1.235	274.6	-4.9	160.8
	.924	1.236	274.6	6.4	193.0
	.920	1.238	274.5	3.6	196.6
	.927	1.233	274.7	-.1	208.3
	.934	1.289	274.9	5.7	210.4
	.933	1.291	275.0	3.0	193.9
	.925	1.290	275.0	6.0	188.5
	.931	1.289	275.0	5.2	192.0
	.929	1.290	275.0	5.2	191.5
	.923	1.293	275.2	2.4	195.6
	.909	1.291	274.8	2.2	200.0
	.909	1.292	274.8	-2.1	194.7
	.900	1.295	274.5	-2.2	194.4
	.895	1.297	274.7	-5.1	195.8
	.894	1.293	274.6	-8.5	194.6
	.883	1.294	274.1	-9.6	192.4
	.879	1.295	273.3	-9.4	188.7
	.875	1.296	273.8	-16.5	183.6
	.867	1.294	273.6	-27.6	179.4
	.855	1.293	273.5	-22.2	175.0
	.845	1.291	273.8	-22.0	167.9
	.841	1.287	274.3	-29.7	160.6
	.841	1.284	273.9	-34.8	157.4
	.842	1.283	274.1	-24.9	154.9
	.841	1.286	274.1	-27.2	151.2
	.841	1.284	273.7	-28.1	141.5
	.827	1.286	274.1	-27.3	135.4
	.814	1.283	274.4	-30.2	126.1
Test Lane	.800	1.283	274.2	-41.3	121.1
	.796	1.233	274.6	-49.8	120.7
	.792	1.286	274.7	-52.1	127.8
	.803	1.284	274.7	-43.5	136.1
	.815	1.291	274.7	-35.4	140.8
	.823	1.297	274.2	-33.1	143.5
	.835	1.294	274.3	-37.2	142.7
	.836	1.296	274.1	-36.6	142.4
	.836	1.296	274.1	-39.2	143.4
	.832	1.297	273.8	-33.8	147.4
	.825	1.293	274.4	-22.9	148.1
	.836	1.299	274.8	-21.0	153.0
	.840	1.298	274.9	-22.9	156.7
	.847	1.301	275.0	-25.2	156.6
	.854	1.297	274.3	-26.1	159.3
	.852	1.296	274.5	-27.0	158.8
	.831	1.293	273.4	-32.1	155.4
	.826	1.293	273.3	-35.4	154.5
	.814	1.298	273.8	-33.0	155.2
	.802	1.293	273.6	-31.5	153.9
	.807	1.300	274.2	-26.7	153.7
	.810	1.299	274.2	-20.4	150.5
	.811	1.298	274.5	-24.4	146.3
	.810	1.295	273.8	-37.1	140.7
	.800	1.297	274.5	-46.8	139.0
	.785	1.299	273.8	-50.3	138.6
	.779	1.294	273.8	-45.0	142.9
	.788	1.296	274.6	-32.7	145.4
	.788	1.296	274.8	-19.2	146.4
	.804	1.297	274.8	-13.6	147.6
	.816	1.296	274.7	-21.7	146.9
	.821	1.302	274.7	-29.6	146.8
	.796	1.302	273.9	-35.6	144.9
	.776	1.298	273.8	-40.8	144.6
	.761	1.292	274.6	-36.0	141.5
	.743	1.291	274.6	-27.6	141.0
	.736	1.290	274.8	-21.1	140.2
	.739	1.288	274.5	-17.4	139.2
	.761	1.290	274.2	-13.0	138.0
	.770	1.293	273.9	-27.0	136.6
	.783	1.294	273.9	-37.5	138.3
	.790	1.296	274.1	-44.7	137.0
	.790	1.294	274.1	-45.5	137.8
	.783	1.296	274.3	-46.4	142.4
	.780	1.299	273.4	-34.4	147.3
	.776	1.299	273.4	-21.7	148.8
	.782	1.299	273.7	-18.4	152.8
	.793	1.305	273.4	-23.5	154.7
	.805	1.312	274.3	-27.5	154.7
	.807	1.307	274.3	-31.5	154.4
	.806	1.307	274.5	-33.6	153.2
	.796	1.310	274.1	-31.8	151.0
	.790	1.310	274.6	-26.7	151.2
	.770	1.301	273.7	-22.5	146.8
	.755	1.300	273.9	-19.8	141.7
	.748	1.301	274.3	-23.2	135.9
	.750	1.298	273.8	-25.0	132.7
	.747	1.302	274.8	-24.3	131.0
	.757	1.303	274.5	-27.0	131.4
Overrun	.755	1.309	274.9	-37.2	128.3

(Continued)

Table 3 (Continued)

Test No. 31 ; 5-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	1.202	1.234	181.2	1.2	47.2
	1.247	1.259	189.1	4.3	47.4
	1.264	1.277	187.6	1.6	46.0
	1.270	1.290	185.3	3.6	45.6
	1.270	1.295	182.4	3.3	44.6
	1.253	1.306	177.9	3.1	44.2
	1.255	1.307	171.5	2.5	44.2
	1.256	1.310	176.7	5.6	48.2
	1.253	1.310	187.8	5.4	53.7
	1.271	1.313	197.8	6.5	56.8
	1.275	1.312	200.5	6.0	56.1
	1.272	1.305	199.8	6.3	57.0
	1.253	1.301	192.5	5.0	52.1
	1.253	1.304	179.9	3.9	45.4
	1.261	1.302	170.0	5.4	44.6
	1.263	1.299	176.0	6.5	49.1
	1.279	1.301	183.6	5.9	52.6
	1.294	1.303	193.5	6.9	59.6
	1.290	1.297	202.9	7.7	59.6
	1.284	1.302	196.2	5.0	55.2
	1.274	1.310	186.2	5.0	51.2
	1.263	1.313	177.3	6.6	48.1
	1.259	1.307	177.5	8.1	49.3
	1.271	1.310	184.5	9.5	60.0
	1.289	1.306	198.1	12.7	69.1
	1.300	1.300	205.0	12.2	75.2
	1.305	1.299	202.4	11.6	75.9
	1.304	1.307	189.3	8.1	68.9
	1.300	1.303	178.6	7.8	60.5
	1.263	1.306	175.5	3.0	52.3
	1.255	1.307	176.7	-.4	45.1
	1.253	1.310	186.2	-3.9	44.9
	1.260	1.312	197.8	-4.5	48.4
	1.268	1.317	204.7	-6.8	54.5
	1.278	1.318	200.3	-5.9	61.7
	1.282	1.319	189.3	-2.3	63.2
	1.281	1.316	174.3	-1.8	67.7
	1.271	1.309	172.2	-1.9	67.3
	1.271	1.309	177.9	-1.9	68.0
	1.274	1.305	185.3	-3.9	67.7
	1.292	1.307	196.6	-4.0	69.1
	1.294	1.304	202.6	-4.6	69.6
	1.297	1.309	198.2	-3.9	67.1
	1.291	1.308	189.8	-4.5	61.5
	1.289	1.316	185.9	-2.7	57.0
	1.281	1.315	184.4	-4.6	52.8
	1.279	1.319	186.8	-6.0	50.0
	1.283	1.318	189.1	-7.7	49.5
	1.294	1.318	190.2	-9.0	48.2
	1.304	1.315	191.3	-10.0	48.1
	1.304	1.315	188.5	-9.8	47.9
	1.305	1.316	187.4	-9.8	48.9
	1.300	1.315	185.7	-10.4	48.4
	1.278	1.310	188.6	-9.8	47.2
	1.274	1.312	190.0	-10.7	47.4
	1.271	1.314	190.8	-10.7	45.8
	1.268	1.317	189.2	-11.5	44.4
	1.269	1.320	191.0	-11.2	43.5
	1.282	1.324	185.3	-10.1	45.4
	1.280	1.321	179.5	-9.5	43.5
Test Lane	1.275	1.323	181.9	-10.3	43.5
	1.281	1.321	187.5	-10.1	43.9
	1.273	1.316	191.9	-10.4	43.9
	1.289	1.316	196.6	-11.5	43.9
	1.293	1.320	197.7	-12.1	45.1
	1.300	1.320	194.9	-10.9	45.3
	1.297	1.319	190.9	-11.3	44.4
	1.302	1.324	184.3	-11.6	44.4
	1.239	1.325	180.8	-11.8	44.4
	1.286	1.325	184.3	-11.8	43.2
	1.284	1.324	187.2	-12.7	43.0
	1.281	1.325	189.2	-11.9	43.9
	1.284	1.327	190.0	-10.9	44.9
	1.287	1.324	188.7	-10.3	43.9
	1.281	1.319	188.2	-10.0	44.0
	1.275	1.317	187.3	-10.6	43.2
	1.275	1.313	186.8	-11.5	42.3
	1.271	1.312	190.5	-11.9	40.0
	1.276	1.317	195.0	-13.1	40.0
	1.283	1.318	194.1	-14.8	40.0
	1.277	1.316	190.8	-13.3	40.9
	1.281	1.319	185.7	-11.3	41.9
	1.287	1.319	182.6	-11.0	42.5
	1.286	1.323	183.5	-11.2	42.5
	1.286	1.323	187.6	-10.9	43.5
	1.293	1.330	193.7	-11.5	43.9
	1.289	1.329	199.7	-12.5	43.7
	1.282	1.330	196.3	-12.3	43.3
	1.290	1.325	189.9	-12.5	41.9
	1.286	1.322	184.4	-12.1	40.2
	1.284	1.322	181.4	-13.7	37.6
	1.291	1.323	181.7	-12.7	37.6
	1.289	1.320	185.1	-13.0	38.6
	1.274	1.316	190.3	-12.5	39.5
	1.279	1.316	196.4	-12.2	40.4
	1.276	1.313	193.4	-11.3	43.0
	1.275	1.319	192.0	-13.0	42.3
	1.277	1.316	192.9	-11.9	40.7
	1.277	1.321	193.4	-12.4	40.4
	1.271	1.323	189.3	-13.0	39.5
	1.274	1.322	186.5	-12.2	38.4
	1.267	1.320	190.4	-12.7	37.9
	1.262	1.324	191.7	-13.7	37.9
	1.262	1.326	189.9	-15.0	36.1
	1.271	1.326	186.1	-13.3	39.0
	1.284	1.329	184.0	-13.9	37.7
	1.287	1.327	186.9	-13.6	38.1
	1.290	1.327	187.6	-14.6	38.1
	1.291	1.324	189.3	-13.7	38.1
	1.286	1.324	192.5	-15.1	36.5
	1.281	1.322	195.0	-14.5	36.0
	1.279	1.326	192.5	-14.0	34.4
	1.266	1.326	187.4	-13.0	33.9
Overrun	1.253	1.321	188.2	-12.2	33.0
	1.241	1.321	187.9	-13.1	33.2
	1.241	1.317	188.6	-13.4	35.1
	1.253	1.319	189.9	-12.4	37.7
	1.267	1.322	192.2	-11.0	43.2
	1.284	1.325	185.7	-8.1	49.6
	1.292	1.322	180.8	-4.6	55.1

(Continued)

Table 3 (Continued)

Test No. 32; 10-deg yaw angle

V_w m/sec	V_c m/sec	W N	B N	S N		V_w m/sec	V_c m/sec	W N	B N	S N
1.670	1.384	262.6	151.6	91.3		1.248	1.328	185.6	-12.1	61.0
1.197	1.242	188.2	-.6	46.2		1.265	1.337	187.6	-9.5	65.2
1.211	1.262	182.5	-2.1	44.1		1.244	1.325	187.8	-14.2	62.0
1.233	1.283	182.2	-3.9	44.1		1.257	1.324	194.8	-11.8	65.0
1.235	1.297	179.5	-2.4	45.7		1.239	1.317	195.8	-15.9	65.5
1.246	1.304	179.1	-.3	48.3		1.261	1.324	195.1	-11.8	70.0
1.244	1.308	182.4	-.9	49.9		1.256	1.324	188.8	-14.2	68.5
1.243	1.301	186.6	-1.2	48.1		1.266	1.325	187.1	-12.3	67.8
1.240	1.301	191.5	.4	49.7		1.263	1.330	184.1	-14.1	68.8
1.234	1.299	192.5	.9	53.0		1.266	1.333	187.0	-14.1	68.8
1.244	1.303	190.2	.9	50.4		1.260	1.331	191.8	-16.1	70.7
1.244	1.307	188.5	.3	48.1		1.251	1.324	197.9	-16.8	70.6
1.245	1.316	187.1	.7	52.0		1.265	1.333	201.0	-15.1	74.7
1.236	1.317	188.3	.9	53.0		1.257	1.325	196.6	-16.5	69.7
1.256	1.320	193.0	.1	48.8		1.263	1.326	193.0	-13.8	67.6
1.253	1.322	194.8	.7	48.6		1.250	1.320	188.5	-15.6	62.4
1.256	1.319	193.5	.4	50.6		1.258	1.327	188.4	-13.2	63.1
1.256	1.312	190.9	1.2	52.3		1.229	1.314	185.4	-18.0	57.2
1.253	1.313	192.4	-.9	50.4		1.236	1.321	191.3	-16.5	59.8
1.257	1.320	190.9	.9	50.2		1.230	1.320	191.3	-18.6	60.1
1.258	1.317	182.7	-.9	47.6		1.240	1.325	193.8	-17.1	62.7
1.261	1.322	182.6	1.0	47.6		1.249	1.326	189.3	-18.2	64.6
1.273	1.324	189.4	.9	51.1		1.261	1.327	188.2	-15.1	68.3
1.285	1.319	192.2	2.7	54.2		1.262	1.326	185.7	-14.2	69.0
1.290	1.319	195.3	4.1	61.9		1.254	1.320	186.6	-15.8	66.9
1.279	1.319	197.8	5.0	68.8		1.256	1.324	188.3	-14.2	67.4
1.282	1.318	193.1	5.4	73.0		1.234	1.316	191.2	-14.2	62.6
1.268	1.322	187.7	3.9	70.6		1.248	1.329	196.1	-13.3	64.8
1.253	1.318	184.4	2.7	64.8		1.241	1.326	194.5	-16.1	63.6
1.256	1.321	183.9	4.5	64.8		1.261	1.339	193.1	-11.0	68.3
1.252	1.316	184.0	2.2	66.4		1.258	1.332	184.5	-14.4	65.7
1.261	1.316	191.3	3.0	72.0		1.282	1.345	185.5	-12.9	67.3
1.260	1.307	195.4	3.4	78.9		1.262	1.337	183.1	-15.0	62.9
1.263	1.315	195.5	4.8	90.4		1.271	1.344	187.6	-13.5	64.5
1.261	1.312	190.9	.9	96.1		1.261	1.332	190.0	-18.5	61.7
1.268	1.309	190.7	.9	98.2		1.263	1.333	197.8	-16.4	61.9
1.271	1.314	191.8	2.1	101.9		1.256	1.325	197.2	-18.8	61.0
1.276	1.320	187.4	1.9	101.5		1.269	1.326	193.6	-17.9	61.0
1.288	1.318	188.4	3.9	103.1		1.268	1.326	189.7	-18.9	60.1
1.279	1.318	188.9	3.6	102.4		1.268	1.331	186.3	-17.4	58.7
1.279	1.318	192.3	3.7	101.3		1.266	1.329	184.0	-17.7	59.3
1.271	1.326	192.3	3.1	100.5		1.252	1.325	182.5	-17.9	57.0
1.256	1.322	189.7	.3	95.6		1.257	1.330	189.1	-17.4	59.4
1.258	1.324	187.1	-.6	91.3		1.248	1.319	187.5	-18.3	56.5
1.259	1.315	188.2	-3.4	86.2		1.260	1.325	192.9	-15.9	61.3
1.255	1.321	188.2	-1.2	85.7		1.249	1.323	191.8	-17.4	57.9
1.245	1.310	188.1	-4.4	82.2		1.271	1.331	192.7	-14.7	60.8
1.242	1.311	193.1	-2.8	80.3		1.249	1.319	188.7	-16.7	56.6
1.245	1.317	194.9	-2.8	83.6		1.260	1.330	193.4	-13.0	57.9
1.238	1.320	192.0	-2.8	81.2		1.245	1.322	190.0	-16.1	54.0
1.249	1.322	189.4	-4.7	79.1		1.257	1.327	191.5	-13.3	56.6
1.248	1.318	187.6	-6.0	73.9		1.245	1.325	191.4	-16.2	55.3
1.261	1.323	188.8	-5.6	73.7		1.260	1.334	190.9	-14.1	56.8
1.255	1.321	187.1	-9.2	66.0		1.265	1.331	184.3	-15.4	59.1
1.263	1.326	189.8	-8.9	64.6		1.271	1.326	183.0	-14.2	57.7
1.263	1.324	192.3	-10.1	63.8		1.273	1.327	184.4	-14.2	60.6
1.261	1.322	193.0	-11.0	61.9		1.260	1.319	185.6	-12.9	60.8
1.273	1.330	191.2	-10.4	63.6		1.266	1.326	189.6	-12.0	65.0
1.259	1.326	189.1	-11.6	62.2		1.248	1.322	189.4	-14.2	61.7
1.271	1.330	188.3	-9.1	64.0		1.261	1.333	182.7	-9.5	64.8

Approach — Test Lane — Overrun

(Continued)

Table 3 (Continued)

Test No. 33 ; 25-deg yaw angle

V_w m/sec	V_c m/sec	W N	B N	S N		V_w m/sec	V_c m/sec	W N	B N	S N
1.087	1.241	186.2	8.4	61.7	Approach	1.098	1.309	186.6	1.8	100.1
1.092	1.248	186.2	6.0	61.7		1.105	1.305	186.7	1.3	98.7
1.102	1.264	186.5	5.5	53.8		1.110	1.307	187.4	2.7	96.3
1.118	1.281	186.9	7.2	57.5		1.111	1.309	186.9	.4	94.5
1.116	1.289	186.2	8.1	52.6		1.106	1.311	186.7	1.3	97.2
1.110	1.287	187.3	9.9	47.5		1.111	1.313	187.2	1.0	101.2
1.108	1.289	187.1	10.2	46.8		1.115	1.314	186.5	1.9	104.9
1.102	1.286	186.5	10.8	50.1		1.110	1.317	185.6	.7	110.7
1.095	1.281	187.3	9.4	52.4		1.106	1.314	185.6	.3	111.2
1.102	1.280	187.3	11.1	53.3		1.106	1.308	186.0	-.1	109.1
1.109	1.283	186.5	9.7	55.6		1.101	1.306	186.0	.4	105.8
1.132	1.285	186.9	11.4	59.8		1.088	1.310	185.7	-.4	104.0
1.133	1.288	187.3	10.2	59.3		1.085	1.307	186.6	.4	100.3
1.140	1.290	186.5	11.2	52.6		1.074	1.304	186.3	.3	100.1
1.141	1.293	186.7	12.0	52.4		1.069	1.303	186.3	-1.0	100.3
1.152	1.292	186.2	12.1	58.2		1.073	1.310	185.8	-.1	101.0
1.141	1.291	185.8	13.6	62.8		1.073	1.309	186.2	0.0	101.0
1.149	1.292	186.0	12.7	60.7		1.085	1.314	186.3	-.9	102.1
1.149	1.294	185.3	10.3	55.2		1.101	1.317	186.5	.9	102.3
1.151	1.296	185.7	11.1	54.5		1.108	1.318	186.5	2.2	101.2
1.142	1.299	186.4	12.3	56.3		1.111	1.316	186.3	2.5	101.6
1.144	1.301	186.5	11.2	55.0		1.112	1.314	186.5	2.4	99.4
1.149	1.299	186.6	15.0	54.2		1.106	1.312	186.5	1.6	99.1
1.152	1.297	186.8	17.7	61.9		1.102	1.308	185.8	.4	99.4
1.154	1.294	186.1	16.8	68.0		1.095	1.307	186.7	1.9	102.3
1.155	1.300	186.3	17.2	70.8		1.093	1.306	186.6	.7	104.4
1.142	1.303	186.4	14.1	67.0		1.091	1.307	186.8	.9	105.1
1.137	1.309	186.5	14.4	60.3		1.091	1.309	186.8	2.8	105.4
1.135	1.311	186.7	15.7	60.3		1.083	1.310	187.3	2.1	103.7
1.119	1.312	186.7	13.3	62.9		1.090	1.314	186.8	2.4	101.2
1.119	1.310	186.9	12.4	64.9		1.090	1.314	186.2	.6	97.3
1.120	1.307	186.2	15.9	78.0		1.105	1.314	186.2	.4	99.1
1.124	1.302	186.0	16.3	105.4		1.117	1.315	186.2	-.6	99.8
1.126	1.304	185.8	16.6	131.6		1.121	1.312	185.6	.1	101.7
1.132	1.306	185.5	17.2	143.7		1.126	1.312	185.5	-1.8	102.3
1.141	1.304	185.8	16.8	147.7		1.127	1.310	186.0	.9	102.8
1.161	1.307	186.2	18.0	147.5		1.126	1.310	186.6	.7	100.5
1.156	1.304	186.2	15.6	141.7		1.122	1.311	186.5	.6	98.9
1.161	1.300	186.8	15.6	135.2		1.125	1.311	187.4	1.3	96.8
1.166	1.299	186.5	17.1	135.8		1.115	1.310	187.5	.4	94.7
1.163	1.294	186.0	18.6	140.0		1.111	1.308	187.5	-.4	94.5
1.155	1.291	186.4	15.6	143.5		1.106	1.306	186.7	.1	93.7
1.162	1.295	186.4	15.0	146.3		1.103	1.305	186.7	.3	92.6
1.150	1.299	186.4	12.4	144.7		1.110	1.308	186.9	.1	93.0
1.156	1.301	186.2	12.9	139.5		1.112	1.306	185.8	0.0	90.1
1.136	1.298	186.1	10.9	133.3		1.106	1.307	185.8	-.1	89.5
1.123	1.300	186.1	9.1	127.0		1.106	1.307	186.0	.6	88.9
1.106	1.302	185.1	9.9	125.6		1.098	1.313	185.8	0.0	88.0
1.098	1.304	185.7	9.9	124.4		1.094	1.313	185.7	-.7	84.9
1.098	1.305	186.7	8.1	126.8		1.083	1.315	186.0	-.3	84.0
1.100	1.305	186.6	6.6	128.4		1.085	1.316	186.3	-1.8	80.8
1.108	1.309	186.3	8.1	131.0	Test Lane	1.070	1.322	185.6	-3.0	78.6
1.106	1.307	187.3	7.0	130.2		1.065	1.315	185.2	-2.8	75.6
1.106	1.308	187.3	5.2	125.4		1.062	1.316	185.0	-4.0	73.8
1.111	1.307	186.3	3.7	118.0		1.062	1.316	185.4	-5.7	73.1
1.111	1.314	186.4	3.6	111.4		1.062	1.314	185.4	-4.0	72.9
1.101	1.313	186.7	2.5	105.6		1.066	1.305	185.7	-6.0	71.2
1.096	1.310	186.0	.9	100.5		1.068	1.306	186.9	-7.0	70.7
1.096	1.310	185.7	2.7	101.6		1.061	1.306	186.7	-5.7	71.9
1.095	1.313	186.3	1.9	101.2	Overrun	1.068	1.304	187.1	-2.2	73.6

(Continued)

Table 3 (Continued)

Test No. 34 ; 25-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N		V_w m/sec	V_c m/sec	W N	B N	S N
Approach	1.140	1.242	367.9	12.3	116.3	Test Lane	1.113	1.318	366.7	-17.9	191.7
	1.153	1.264	368.8	14.3	116.1		1.116	1.316	367.7	-15.9	192.9
	1.159	1.282	369.0	14.6	110.2		1.117	1.313	367.0	-16.7	193.3
	1.170	1.291	368.1	12.4	103.5		1.117	1.316	368.1	-17.9	192.9
	1.176	1.300	368.9	12.9	98.3		1.119	1.310	367.1	-18.1	193.1
	1.164	1.304	368.0	14.0	106.8		1.114	1.312	367.2	-16.6	193.6
	1.173	1.303	367.1	15.0	104.0		1.116	1.317	367.6	-18.1	194.0
	1.188	1.306	367.8	17.8	101.2		1.110	1.318	367.6	-17.3	194.5
	1.188	1.306	367.3	19.0	105.3		1.116	1.319	367.6	-14.9	195.7
	1.199	1.302	367.3	21.1	114.5		1.119	1.318	367.4	-16.7	197.3
	1.208	1.299	367.3	21.4	116.1		1.0<4	1.314	367.6	-16.7	198.7
	1.203	1.301	367.1	19.8	110.2		1.122	1.317	366.5	-16.4	201.1
	1.208	1.308	367.8	18.8	106.5		1.0<4	1.312	366.5	-16.3	199.9
	1.212	1.308	367.4	17.8	117.0		1.125	1.316	366.7	-17.5	200.6
	1.206	1.308	367.6	15.6	118.7		1.118	1.321	366.7	-17.8	198.7
	1.201	1.315	367.7	15.6	111.7		1.122	1.325	367.8	-15.6	199.2
	1.205	1.310	367.3	19.0	110.5		1.116	1.322	367.8	-17.5	196.9
	1.198	1.308	367.8	17.6	125.9		1.116	1.327	368.3	-17.5	198.2
	1.209	1.313	368.1	18.5	131.0		1.118	1.327	367.0	-16.3	200.1
	1.207	1.317	367.8	19.8	125.6		1.120	1.322	367.6	-16.3	202.0
	1.212	1.317	367.8	18.1	120.8		1.120	1.324	366.5	-17.5	204.5
	1.212	1.319	367.9	15.8	129.9		1.122	1.319	366.2	-16.6	204.5
	1.216	1.318	367.4	18.5	132.9		1.132	1.327	367.2	-15.2	208.0
	1.203	1.322	367.4	19.6	124.5		1.121	1.331	367.2	-17.3	205.3
	1.204	1.319	367.4	20.7	121.4		1.130	1.338	368.4	-14.3	206.0
	1.201	1.315	367.6	24.0	129.6		1.127	1.339	368.3	-14.6	204.8
	1.201	1.315	367.3	23.9	133.1		1.130	1.345	369.0	-12.6	205.2
	1.186	1.310	366.6	21.9	135.2		1.127	1.343	367.4	-12.7	204.6
	1.173	1.298	366.7	23.3	139.6		1.133	1.335	368.0	-12.4	205.7
	1.170	1.298	366.0	21.7	148.0		1.135	1.334	367.2	-13.2	207.8
	1.176	1.301	366.6	19.3	163.0		1.131	1.334	367.2	-14.4	208.3
	1.170	1.301	366.6	19.5	184.0		1.138	1.334	367.6	-13.1	212.7
	1.173	1.298	366.6	21.4	204.6		1.127	1.325	367.3	-15.5	210.6
	1.172	1.300	366.6	21.1	224.9		1.139	1.332	367.8	-12.9	213.6
	1.163	1.298	367.0	20.8	245.8		1.123	1.326	366.8	-15.6	213.0
	1.166	1.302	367.9	23.1	263.4		1.122	1.324	367.7	-12.3	214.6
	1.169	1.306	368.0	24.5	265.9		1.120	1.326	367.1	-15.0	213.9
	1.172	1.308	367.9	22.8	261.7		1.126	1.329	367.8	-14.7	215.7
	1.186	1.314	368.4	25.2	267.8		1.118	1.332	367.3	-14.9	215.1
	1.190	1.319	367.1	24.9	267.8		1.113	1.332	367.4	-14.4	211.6
	1.190	1.317	366.7	24.2	262.9		1.118	1.333	368.2	-13.7	211.5
	1.185	1.318	366.7	20.1	262.0		1.116	1.327	367.9	-13.7	210.4
	1.166	1.324	366.8	19.0	261.7		1.111	1.321	367.9	-11.7	209.0
	1.150	1.324	366.7	9.9	251.0		1.111	1.316	367.4	-12.9	209.9
	1.139	1.324	367.6	9.9	242.1		1.120	1.313	367.4	-12.3	209.7
	1.131	1.325	367.1	5.9	231.2		1.120	1.312	366.1	-12.7	208.3
	1.122	1.320	367.2	1.2	217.9		1.111	1.315	366.3	-13.4	202.0
	1.133	1.316	367.6	-1.5	209.9		1.117	1.327	367.7	-13.8	198.5
	1.129	1.313	367.0	-2.7	208.0		1.120	1.322	367.6	-15.9	188.7
	1.116	1.313	367.2	-8.2	208.3		1.131	1.332	368.5	-15.0	185.4
	1.097	1.312	367.0	-10.2	208.8		1.128	1.333	368.2	-19.8	177.4
	1.089	1.316	367.0	-9.5	209.7		1.147	1.338	368.9	-20.2	172.3
	1.084	1.322	367.2	-11.1	208.8		1.146	1.332	367.4	-22.0	166.0
	1.085	1.319	367.2	-12.0	204.1	Overrun	1.131	1.334	368.1	-23.7	161.3
	1.108	1.321	367.7	-9.5	204.5		1.112	1.332	367.2	-26.8	157.1
	1.118	1.322	367.3	-9.9	203.4		1.107	1.332	367.3	-25.4	154.4
	1.126	1.321	367.2	-10.9	201.3		1.082	1.329	366.3	-25.8	153.4
	1.127	1.320	366.8	-13.8	197.5		1.066	1.329	366.1	-25.4	153.2
	1.122	1.318	366.8	-13.5	197.3		1.077	1.329	365.9	-15.5	164.8
	1.116	1.324	367.0	-14.6	194.9		1.081	1.327	365.7	-9.5	163.0

(Continued)

Table 3 (Continued)

Test No. 35 ; 10 -deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	1.253	1.253	364.6	11.2	121.2
	1.275	1.272	364.8	8.1	113.8
	1.306	1.298	364.0	10.2	113.8
	1.318	1.317	363.6	7.9	106.8
	1.327	1.326	363.8	11.3	109.5
	1.334	1.331	364.5	15.9	113.8
	1.331	1.330	364.8	17.2	120.7
	1.332	1.327	365.0	17.2	119.6
	1.323	1.322	365.0	19.0	121.9
	1.317	1.317	364.6	18.1	122.4
	1.319	1.319	364.4	17.6	124.5
	1.319	1.321	364.0	16.1	122.2
	1.307	1.320	364.1	16.7	120.0
	1.310	1.321	364.1	15.3	118.0
	1.316	1.327	364.7	17.0	120.5
	1.314	1.330	364.4	15.5	120.0
	1.313	1.324	364.6	18.1	124.7
	1.308	1.325	364.5	15.8	129.1
	1.307	1.327	364.2	18.4	134.7
	1.303	1.325	363.7	19.0	131.0
	1.306	1.321	363.5	19.3	132.2
	1.311	1.326	363.6	21.3	134.0
	1.331	1.326	364.5	24.1	137.8
	1.341	1.324	364.5	23.0	136.6
	1.357	1.323	364.6	23.6	139.4
	1.353	1.321	365.0	24.8	141.1
	1.346	1.324	364.7	22.5	139.7
	1.344	1.324	364.0	21.0	135.2
	1.336	1.321	364.1	19.3	127.7
	1.323	1.323	364.1	18.8	122.9
	1.310	1.327	364.4	13.5	111.4
	1.315	1.328	364.1	5.9	115.2
	1.304	1.330	363.9	2.7	122.8
	1.295	1.329	363.8	1.0	135.4
	1.288	1.330	364.1	-5.2	149.4
	1.286	1.327	363.7	-5.3	168.4
	1.269	1.328	363.8	-2.4	172.1
	1.266	1.330	363.9	-2.7	173.5
	1.272	1.337	363.9	-1.2	177.4
	1.275	1.343	363.6	1.3	178.1
	1.276	1.338	363.8	2.7	176.1
	1.296	1.341	364.4	5.2	182.1
	1.296	1.337	364.0	5.5	188.7
	1.289	1.336	364.0	3.2	187.9
	1.284	1.331	363.9	1.8	179.1
	1.282	1.338	363.6	.4	169.0
	1.264	1.337	363.3	-5.3	149.9
	1.262	1.337	363.5	-7.9	133.1
	1.265	1.337	363.7	-12.2	124.3
	1.266	1.327	364.2	-14.7	122.9
	1.269	1.328	364.7	-18.8	120.5
	1.272	1.328	364.6	-18.2	120.5
	1.275	1.328	364.6	-19.5	122.2
	1.273	1.327	365.2	-18.7	122.4
	1.280	1.332	365.2	-19.0	123.5
	1.282	1.340	365.1	-15.6	125.9
	1.278	1.339	364.8	-20.1	125.0
	1.273	1.344	365.2	-20.2	125.0
	1.275	1.346	365.0	-20.4	125.7
	1.263	1.344	364.6	-22.5	124.9
Test Lane	1.257	1.340	364.2	-24.2	123.5
	1.264	1.343	364.4	-18.1	127.1
	1.261	1.341	363.9	-20.4	127.7
	1.264	1.342	363.3	-17.0	129.2
	1.277	1.342	363.7	-15.6	130.5
	1.277	1.337	364.2	-16.1	131.5
	1.279	1.334	364.5	-18.5	130.8
	1.284	1.333	364.2	-16.4	131.7
	1.280	1.331	364.4	-19.5	130.8
	1.273	1.333	363.8	-19.3	129.8
	1.281	1.341	364.1	-20.1	129.4
	1.282	1.343	364.4	-19.2	131.0
	1.279	1.348	364.5	-17.9	131.9
	1.279	1.345	365.1	-18.1	131.5
	1.282	1.344	365.0	-17.2	133.3
	1.280	1.344	364.2	-15.2	134.3
	1.283	1.344	364.5	-16.8	135.0
	1.284	1.345	364.5	-17.5	134.3
	1.281	1.350	364.4	-16.1	134.1
	1.272	1.350	365.0	-17.9	133.4
	1.266	1.350	365.1	-17.9	134.0
	1.260	1.352	365.0	-17.2	135.4
	1.258	1.348	364.9	-16.8	136.9
	1.259	1.347	364.4	-14.4	139.4
	1.266	1.346	363.7	-13.5	140.8
	1.283	1.348	364.4	-13.2	145.5
	1.281	1.345	364.7	-13.2	143.9
	1.288	1.346	364.9	-12.7	144.1
	1.287	1.343	364.8	-15.3	143.2
	1.282	1.342	365.0	-13.8	142.9
	1.271	1.340	364.4	-16.2	137.3
	1.277	1.341	363.7	-14.4	137.6
	1.275	1.342	364.0	-15.8	137.1
	1.284	1.348	364.4	-16.7	138.2
	1.286	1.348	364.8	-18.2	138.3
	1.284	1.344	364.8	-17.3	138.7
	1.280	1.346	365.6	-19.3	137.6
	1.276	1.342	365.0	-18.1	136.6
	1.280	1.345	365.3	-17.8	137.1
	1.282	1.348	364.8	-17.9	135.7
	1.284	1.350	364.7	-17.5	137.3
	1.276	1.345	363.8	-18.2	137.1
	1.276	1.350	364.5	-17.8	137.1
	1.262	1.346	363.9	-18.5	135.4
	1.264	1.345	364.5	-16.2	136.8
	1.258	1.345	365.0	-15.3	136.1
	1.266	1.346	365.0	-14.1	136.9
	1.276	1.342	364.9	-15.2	136.9
	1.285	1.342	364.8	-12.7	136.2
	1.283	1.346	364.8	-15.6	132.7
	1.284	1.348	364.1	-18.1	129.6
	1.290	1.352	364.6	-17.0	127.1
	1.293	1.352	364.1	-18.1	126.1
	1.288	1.349	364.5	-19.6	124.5
	1.291	1.350	363.9	-18.8	126.4
	1.297	1.347	364.5	-17.9	127.0
	1.301	1.347	363.7	-18.4	128.2
	1.299	1.347	363.8	-15.6	129.2
	1.306	1.354	363.8	-10.5	136.1
Overrun	1.310	1.351	364.4	-5.5	142.2

(Continued)

Table 3 (Continued)

Test No. 36 ; 5-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	1.283	1.257	363.7	26.5	130.0
	1.296	1.276	367.3	25.6	127.3
	1.311	1.286	369.8	22.9	120.3
	1.325	1.295	370.2	24.2	119.6
	1.334	1.299	363.8	25.1	120.7
	1.338	1.305	357.6	23.5	120.5
	1.340	1.306	355.9	23.5	117.3
	1.334	1.311	358.3	27.1	121.5
	1.326	1.305	361.5	26.6	121.5
	1.319	1.301	365.9	27.8	122.4
	1.317	1.296	372.0	28.3	124.5
	1.312	1.294	369.9	27.7	128.0
	1.323	1.292	364.1	28.1	127.3
	1.335	1.298	364.7	28.6	130.0
	1.338	1.298	369.6	28.3	128.5
	1.346	1.299	371.5	29.0	130.0
	1.347	1.298	371.0	30.8	130.7
	1.341	1.298	374.2	28.9	133.7
	1.329	1.296	372.8	28.4	138.4
	1.332	1.298	367.9	26.3	141.3
	1.330	1.300	361.9	25.9	137.9
	1.341	1.299	363.4	25.1	136.1
	1.352	1.301	366.1	25.7	137.7
	1.359	1.303	369.5	25.4	136.7
	1.357	1.300	370.4	26.6	136.8
	1.352	1.297	369.4	27.2	139.1
	1.347	1.297	365.1	27.2	139.8
	1.340	1.295	362.7	27.2	139.8
	1.338	1.296	357.2	27.4	139.6
	1.332	1.300	352.2	26.8	137.2
	1.332	1.304	356.0	22.0	137.3
	1.327	1.302	369.8	15.0	137.9
	1.323	1.302	370.0	10.5	137.7
	1.317	1.301	365.0	6.3	138.6
	1.321	1.300	369.9	2.8	144.8
	1.323	1.298	375.6	3.0	147.4
	1.327	1.303	365.6	4.0	150.2
	1.327	1.304	361.9	6.3	152.7
	1.327	1.305	368.2	6.4	154.9
	1.332	1.311	368.2	8.8	157.9
	1.325	1.312	360.0	9.7	163.1
	1.327	1.315	357.8	11.4	165.5
	1.322	1.317	362.5	8.5	165.7
	1.317	1.319	366.1	7.3	162.6
	1.315	1.319	368.4	5.8	157.2
	1.313	1.322	369.5	4.3	149.0
	1.305	1.322	364.9	2.2	138.7
	1.297	1.320	362.4	-.7	124.3
	1.307	1.319	366.7	-2.4	113.7
	1.305	1.313	366.8	-7.0	102.4
	1.307	1.310	371.2	-9.9	93.2
	1.300	1.303	375.5	-13.4	86.9
	1.307	1.301	376.8	-13.8	86.7
	1.296	1.302	369.6	-15.3	86.0
	1.302	1.308	369.8	-14.6	87.8
	1.307	1.309	366.0	-14.0	89.0
	1.309	1.312	365.1	-12.8	89.5
	1.312	1.315	364.2	-12.2	90.2
	1.302	1.310	362.8	-13.8	90.6
	1.290	1.308	359.8	-14.9	89.5
Test Lane	1.279	1.303	357.1	-15.2	88.8
	1.283	1.307	357.8	-15.2	90.2
	1.286	1.308	361.1	-15.5	92.3
	1.294	1.308	364.6	-15.0	93.7
	1.305	1.308	365.8	-13.8	96.7
	1.314	1.312	371.6	-14.3	97.2
	1.311	1.310	376.7	-14.0	97.7
	1.307	1.306	373.4	-14.3	96.1
	1.305	1.308	367.6	-13.1	95.4
	1.291	1.308	367.4	-15.9	92.5
	1.291	1.313	367.9	-15.9	91.8
	1.292	1.311	363.9	-17.6	91.3
	1.290	1.310	358.9	-17.9	89.7
	1.296	1.312	360.4	-18.5	90.0
	1.299	1.309	360.1	-17.0	90.6
	1.292	1.305	358.1	-18.3	92.7
	1.297	1.309	357.8	-17.1	90.7
	1.304	1.317	360.6	-17.1	90.7
	1.292	1.316	364.6	-18.8	88.3
	1.294	1.320	367.9	-18.3	88.8
	1.293	1.317	369.4	-18.3	86.9
	1.296	1.314	371.1	-18.8	88.8
	1.289	1.308	368.9	-17.6	89.2
	1.309	1.316	367.2	-15.2	93.5
	1.317	1.313	368.8	-15.8	95.8
	1.329	1.322	365.8	-12.9	98.6
	1.323	1.321	360.5	-12.5	99.1
	1.321	1.322	365.5	-12.3	100.3
	1.319	1.319	366.7	-12.3	99.8
	1.321	1.323	359.8	-12.2	97.9
	1.322	1.324	359.2	-13.7	96.0
	1.324	1.326	363.9	-14.1	95.8
	1.329	1.320	364.2	-15.2	95.6
	1.323	1.314	362.4	-14.7	93.7
	1.315	1.313	365.3	-14.9	94.4
	1.301	1.306	366.9	-16.2	95.1
	1.296	1.305	367.3	-14.3	94.7
	1.291	1.307	368.1	-15.2	94.7
	1.280	1.311	367.4	-16.2	93.2
	1.290	1.313	369.1	-15.5	92.1
	1.289	1.311	371.6	-14.9	91.4
	1.286	1.312	369.9	-14.6	92.7
	1.285	1.310	367.0	-14.6	90.7
	1.297	1.313	363.4	-13.1	93.2
	1.288	1.308	359.6	-12.3	94.0
	1.298	1.309	362.6	-11.4	97.2
	1.307	1.313	364.7	-13.2	97.9
	1.315	1.322	362.0	-10.5	101.3
	1.313	1.321	365.8	-11.6	102.9
	1.315	1.327	369.8	-11.3	104.1
	1.313	1.330	365.2	-9.7	103.4
Overrun	1.311	1.325	361.5	-9.7	102.2
	1.309	1.320	367.3	-11.6	102.4
	1.310	1.315	369.5	-11.3	100.1
	1.320	1.314	371.1	-12.8	100.7
	1.326	1.310	368.9	-13.1	100.5
	1.337	1.315	371.6	-11.3	103.4
	1.337	1.317	369.6	-10.0	107.4
	1.341	1.320	361.5	-4.3	114.9
	1.329	1.313	348.1	1.9	119.3

(Continued)

Table 3 (Continued)

Test No. 37; 5-deg yaw angle

V_w m/sec	V_c m/sec	W N	B N	S N
2.183	2.193	291.5	2.8	104.8
2.143	2.164	290.4	3.8	101.9
2.141	2.164	293.1	5.4	100.7
2.133	2.167	291.3	5.9	97.7
2.122	2.158	289.3	10.5	98.4
2.098	2.146	275.5	13.7	94.9
2.102	2.137	266.0	12.3	92.4
2.097	2.140	255.5	8.9	91.0
2.105	2.144	249.6	5.1	88.8
2.105	2.133	257.1	.1	85.6
2.117	2.133	279.3	-.1	93.3
2.133	2.142	304.6	2.4	100.2
2.156	2.142	318.9	8.2	107.6
2.160	2.143	317.1	15.0	107.2
2.160	2.150	295.8	18.2	106.5
2.142	2.150	268.9	16.9	93.1
2.114	2.144	246.8	15.8	89.9
2.090	2.150	241.4	12.7	87.2
2.087	2.152	251.9	10.5	94.9
2.096	2.158	276.3	12.4	104.2
2.117	2.161	296.8	15.9	118.8
2.145	2.180	307.2	17.0	122.3
2.158	2.181	305.5	16.7	122.7
2.151	2.172	290.8	14.9	114.0
2.148	2.175	272.7	11.5	102.8
2.143	2.192	264.2	10.9	96.8
2.135	2.187	262.1	10.0	97.9
2.142	2.190	260.7	8.6	95.6
2.153	2.197	268.5	7.1	97.0
2.158	2.200	273.6	7.9	100.9
2.170	2.199	272.5	4.5	102.8
2.178	2.201	277.9	1.3	103.5
2.181	2.208	289.3	.6	111.3
2.185	2.219	297.4	2.4	120.7
2.191	2.219	303.7	3.0	128.5
2.188	2.218	303.8	4.7	135.4
2.179	2.220	290.7	6.0	131.9
2.168	2.223	277.0	5.9	123.5
2.163	2.214	266.9	4.1	118.2
2.156	2.213	264.9	2.2	116.3
2.156	2.212	267.9	1.2	117.2
2.163	2.208	275.0	2.7	126.7
2.166	2.198	278.3	3.6	135.2
2.159	2.204	277.7	4.4	140.0
2.151	2.205	275.5	7.6	136.5
2.139	2.206	274.8	6.8	129.9
2.129	2.208	280.9	1.9	120.0
2.117	2.205	283.5	-2.1	109.4
2.120	2.202	282.0	-6.0	98.0
2.119	2.206	278.8	-12.4	89.5
2.121	2.199	279.2	-15.2	83.7
2.120	2.199	276.4	-14.6	80.2
2.118	2.199	279.3	-14.6	78.4
2.104	2.188	283.9	-14.9	77.3
2.109	2.183	287.0	-15.0	77.7
2.107	2.184	287.0	-14.4	77.7
2.107	2.184	285.1	-15.0	78.0
2.109	2.190	281.1	-15.2	79.8
2.107	2.185	276.0	-17.5	80.9
2.074	2.169	273.8	-21.1	79.3
2.068	2.164	271.2	-22.3	78.2
2.062	2.156	272.2	-21.3	78.0
2.060	2.150	272.4	-19.6	78.7
2.068	2.162	276.4	-17.2	78.0
2.077	2.164	278.6	-16.1	77.3
2.061	2.158	279.9	-17.2	75.6
2.045	2.146	281.1	-19.8	74.0
2.037	2.142	283.1	-21.6	72.4
2.035	2.140	285.2	-22.2	71.8
2.043	2.151	283.8	-19.1	73.8
2.036	2.146	279.6	-17.0	74.7
2.060	2.161	273.2	-15.9	76.1
2.071	2.167	271.3	-15.3	75.0
2.075	2.165	269.5	-16.4	74.3
2.063	2.161	271.5	-19.8	74.3
2.080	2.174	278.8	-21.3	75.2
2.077	2.174	286.5	-21.9	74.5
2.079	2.173	289.8	-22.0	74.7
2.076	2.176	288.8	-21.1	75.9
2.085	2.169	286.6	-19.9	75.0
2.082	2.166	278.7	-18.8	75.0
2.082	2.173	274.4	-17.9	74.5
2.074	2.182	271.1	-18.7	75.4
2.077	2.179	270.6	-20.4	76.1
2.070	2.182	269.7	-22.7	75.4
2.071	2.182	273.6	-24.5	73.8
2.070	2.181	276.4	-23.7	73.6
2.091	2.183	277.7	-21.0	73.6
2.094	2.198	280.6	-18.1	71.7
2.111	2.212	284.4	-16.4	70.1
2.120	2.220	290.0	-15.2	69.9
2.122	2.222	287.6	-14.6	71.7
2.118	2.231	282.3	-14.3	73.8
2.128	2.237	272.3	-15.3	75.6
2.135	2.234	265.2	-14.4	76.3
2.142	2.243	260.0	-14.4	76.4
2.153	2.253	265.1	-16.7	77.1
2.152	2.246	274.7	-20.1	73.8
2.154	2.241	285.7	-22.3	72.7
2.157	2.242	295.9	-24.2	74.5
2.153	2.244	298.3	-22.0	77.9
2.154	2.234	291.1	-21.1	76.8
2.155	2.234	281.2	-21.1	77.0
2.142	2.235	275.9	-19.6	76.4
2.127	2.232	268.8	-18.1	75.7
2.132	2.228	265.7	-20.8	74.0
2.125	2.224	267.7	-20.5	72.4
2.115	2.218	271.7	-19.9	70.9
2.124	2.208	277.6	-19.3	71.7
2.134	2.213	280.9	-18.1	71.7
2.126	2.209	283.1	-18.4	70.1
2.132	2.207	284.3	-21.0	69.9
2.128	2.201	287.2	-22.3	70.6
2.115	2.201	282.7	-23.1	70.6
2.109	2.192	275.4	-24.9	72.0
2.105	2.188	270.4	-25.7	74.1
2.098	2.184	267.4	-25.7	74.5
2.101	2.188	266.5	-23.3	75.2
2.111	2.188	267.0	-15.0	79.8
2.111	2.185	266.7	-5.0	88.8

Approach

Test Lane

Overrun

(Continued)

Table 3 (Continued)

Test No. 38; 10-deg yaw angle

V_w m/sec	V_c m/sec	W N	B N	S N		V_w m/sec	V_c m/sec	W N	B N	S N
2.087	2.097	280.9	10.4	99.6	Approach	2.082	2.194	283.5	-16.0	97.2
2.138	2.161	285.4	14.0	92.9		2.090	2.203	282.6	-14.9	98.2
2.131	2.163	282.4	16.4	89.3		2.077	2.196	275.8	-14.3	95.6
2.114	2.156	278.1	14.9	80.3		2.064	2.192	270.0	-11.0	91.7
2.117	2.171	284.3	17.0	89.4		2.069	2.196	267.9	-11.0	89.4
2.125	2.181	271.7	19.4	88.0		2.066	2.197	268.1	-13.7	88.4
2.123	2.175	258.2	17.8	90.5		2.057	2.180	267.2	-19.3	86.7
2.096	2.171	254.5	14.8	82.5		2.064	2.164	270.2	-22.4	86.1
2.087	2.174	252.9	10.7	87.5		2.071	2.171	273.4	-25.1	87.5
2.081	2.167	255.4	8.0	85.6		2.074	2.175	277.8	-25.4	88.4
2.083	2.163	261.8	6.8	88.6		2.070	2.169	277.5	-25.1	87.0
2.091	2.160	270.8	8.6	93.7		2.064	2.169	277.5	-21.7	86.3
2.109	2.154	280.7	6.8	98.2		2.052	2.171	277.9	-18.7	86.0
2.128	2.150	289.9	10.7	105.1		2.045	2.170	279.3	-18.5	85.8
2.129	2.140	294.0	13.3	103.0		2.042	2.163	277.9	-16.7	87.5
2.128	2.137	294.6	13.7	106.8		2.035	2.159	272.4	-15.1	89.1
2.123	2.141	291.8	12.8	102.7		2.017	2.159	268.1	-16.6	88.9
2.121	2.145	282.3	13.0	106.1		2.026	2.162	267.4	-16.3	86.8
2.105	2.145	274.4	8.3	96.3		2.037	2.156	267.1	-14.2	88.0
2.091	2.142	269.8	5.0	100.5		2.033	2.152	267.8	-12.8	89.6
2.063	2.133	269.8	4.4	94.6		2.033	2.152	273.0	-12.8	91.5
2.057	2.121	274.8	7.0	101.1		2.044	2.144	279.2	-13.7	91.8
2.057	2.115	288.7	11.9	95.1		2.030	2.136	280.0	-17.5	93.9
2.078	2.118	293.4	18.4	104.9	Test Lane	2.025	2.127	281.0	-20.5	94.6
2.097	2.132	290.8	22.0	95.3		2.016	2.124	277.2	-24.5	93.9
2.111	2.135	281.2	20.6	98.9		2.006	2.119	276.5	-25.3	92.9
2.096	2.127	271.6	15.4	84.1		2.016	2.121	273.2	-23.6	95.6
2.070	2.121	261.3	10.3	82.9		2.024	2.136	273.8	-20.5	97.9
2.035	2.113	260.9	5.9	71.0		2.015	2.141	270.2	-19.4	96.8
2.028	2.103	264.7	6.2	83.6		2.008	2.133	270.5	-17.9	92.7
2.028	2.113	265.8	4.9	87.5		2.007	2.128	269.3	-16.1	91.1
2.032	2.114	262.2	4.4	103.9		2.002	2.129	270.3	-11.9	91.1
2.049	2.120	260.3	5.2	116.1		2.006	2.129	270.6	-8.2	92.4
2.064	2.122	260.4	5.6	134.6		2.011	2.131	270.6	-6.2	93.2
2.060	2.120	269.3	3.5	141.5		2.016	2.132	271.6	-8.6	93.7
2.060	2.115	285.9	8.9	151.1		2.008	2.128	272.1	-12.4	91.0
2.070	2.121	298.8	13.6	158.4		1.997	2.124	276.0	-15.5	89.1
2.081	2.130	302.5	16.7	164.8		1.992	2.124	276.4	-17.9	88.7
2.087	2.131	299.6	17.6	166.5		2.004	2.126	277.8	-18.4	90.8
2.080	2.129	288.0	15.4	165.5		2.005	2.131	275.8	-16.3	93.7
2.068	2.126	270.1	10.1	157.2		2.019	2.135	273.6	-15.4	96.3
2.056	2.124	260.7	6.7	150.3		2.017	2.131	269.3	-17.2	94.4
2.048	2.119	254.1	6.1	146.5		2.022	2.129	268.9	-18.2	93.7
2.053	2.131	251.6	7.1	147.3		2.019	2.132	272.6	-17.8	96.0
2.051	2.141	254.3	10.6	148.7		2.028	2.147	275.8	-17.2	101.0
2.049	2.147	263.0	9.1	150.8		2.033	2.153	280.3	-16.7	104.3
2.046	2.141	269.4	6.2	148.2		2.042	2.158	280.6	-16.7	107.0
2.040	2.139	276.9	2.0	141.1		2.038	2.160	279.1	-16.7	107.5
2.032	2.143	282.9	-2.6	126.8		2.036	2.163	274.1	-16.3	105.5
2.032	2.148	285.0	-11.9	112.5		2.040	2.159	271.3	-16.7	101.5
2.033	2.143	286.8	-18.1	99.3		2.032	2.163	267.6	-16.7	97.7
2.042	2.157	286.1	-18.1	91.1	Overrun	2.030	2.164	267.3	-16.0	95.8
2.053	2.172	281.2	-17.2	86.5		2.037	2.169	267.1	-13.6	98.0
2.049	2.170	273.5	-17.6	85.5		2.051	2.182	268.5	-12.5	101.0
2.051	2.172	268.2	-16.7	84.4		2.044	2.181	270.2	-15.8	99.6
2.057	2.174	265.5	-12.4	85.3		2.042	2.177	269.3	-16.3	97.4
2.055	2.181	266.0	-12.8	87.2		2.055	2.192	269.6	-14.3	95.5
2.057	2.184	270.8	-16.7	88.9		2.053	2.204	270.3	-13.0	92.4
2.061	2.181	276.7	-19.9	89.8		2.053	2.188	270.9	-9.5	93.0
2.066	2.179	281.1	-17.8	92.7		2.066	2.184	267.0	.8	103.7

(Continued)

Table 3 (Continued)

Test No. 39; 25-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	1.975	2.235	269.5	16.0	116.3
	1.962	2.231	273.6	12.8	90.5
	1.941	2.211	290.6	10.3	87.2
	1.947	2.217	284.1	9.3	92.6
	1.949	2.209	287.0	13.5	86.1
	1.937	2.197	265.0	14.8	81.7
	1.946	2.191	255.0	16.3	88.7
	1.945	2.196	249.6	19.5	79.6
	1.926	2.188	248.0	17.4	85.8
	1.919	2.187	268.2	16.8	91.0
	1.915	2.181	292.5	13.2	95.9
	1.930	2.188	312.0	13.5	106.6
	1.960	2.183	317.4	10.5	104.2
	1.975	2.187	313.8	12.3	112.4
	1.964	2.185	288.6	12.3	93.0
	1.947	2.186	259.6	13.7	101.9
	1.915	2.178	238.7	14.9	77.5
	1.837	2.177	231.4	12.9	93.8
	1.879	2.173	247.3	12.6	79.6
	1.902	2.163	267.8	12.6	111.9
	1.914	2.170	296.9	16.3	98.7
	1.940	2.182	307.4	16.0	131.2
	1.954	2.183	311.3	20.9	109.8
	1.965	2.193	294.8	21.0	130.7
	1.942	2.201	284.2	19.5	98.9
	1.931	2.201	266.0	15.1	117.3
	1.920	2.193	267.3	17.4	97.2
	1.920	2.194	266.5	16.6	125.4
	1.931	2.200	273.0	18.1	106.5
	1.958	2.205	269.9	19.7	130.5
	1.972	2.211	265.8	21.3	118.2
	1.981	2.235	261.8	16.4	137.5
	1.9[illegible]6	2.243	264.9	15.5	142.1
	1.91[illegible]	2.235	267.2	11.1	170.0
	1.964	2.236	278.0	5.9	177.9
	1.960	2.242	297.0	2.7	193.7
	1.951	2.233	306.8	5.1	192.6
	1.933	2.229	306.3	4.8	192.3
	1.934	2.229	300.0	9.6	190.0
	1.929	2.232	288.6	15.4	190.9
	1.934	2.238	274.2	18.1	191.9
	1.931	2.237	261.0	18.3	196.5
	1.941	2.246	255.8	17.7	197.5
	1.935	2.258	253.9	16.8	198.1
	1.938	2.252	264.3	17.5	199.3
	1.935	2.243	275.8	19.7	205.4
	1.937	2.246	285.4	18.3	212.1
	1.927	2.241	291.2	17.1	212.1
	1.909	2.232	294.9	11.9	209.6
	1.899	2.239	290.8	5.6	207.7
	1.893	2.244	285.9	1.5	206.8
	1.887	2.245	276.2	.4	200.2
	1.884	2.243	267.2	-.6	189.6
	1.892	2.243	265.0	.4	179.3
	1.887	2.235	266.2	.7	171.6
	1.874	2.231	266.8	.3	163.5
	1.878	2.222	272.7	-.3	158.9
	1.884	2.222	282.5	.9	159.5
	1.891	2.220	289.5	4.5	164.7
	1.892	2.213	290.7	9.1	169.3
Test Lane	1.890	2.207	289.1	10.3	170.0
	1.878	2.203	285.0	10.8	168.6
	1.864	2.200	278.1	10.0	168.6
	1.845	2.192	269.6	6.5	164.5
	1.829	2.194	265.8	-1.0	156.3
	1.824	2.188	266.0	-3.5	150.5
	1.823	2.193	270.1	-4.8	150.0
	1.827	2.192	275.1	-5.1	150.9
	1.832	2.197	279.0	-7.7	150.9
	1.834	2.197	283.1	-8.5	153.7
	1.837	2.194	283.9	-8.7	158.4
	1.840	2.190	283.4	-5.8	163.8
	1.830	2.189	280.3	-2.7	168.2
	1.819	2.184	279.9	-.4	171.4
	1.816	2.180	277.9	1.6	173.1
	1.819	2.192	279.7	2.7	174.5
	1.819	2.191	278.6	2.4	174.4
	1.828	2.188	278.0	1.2	171.4
	1.842	2.191	273.3	2.1	168.8
	1.849	2.191	270.7	4.4	166.5
	1.839	2.179	266.8	4.8	161.9
	1.832	2.170	267.2	3.3	157.7
	1.828	2.168	271.1	2.5	156.3
	1.821	2.165	280.6	1.9	160.3
	1.828	2.167	288.6	-.9	166.1
	1.836	2.170	289.8	-1.8	172.1
	1.843	2.178	287.6	-2.2	174.0
	1.848	2.186	284.0	-3.5	174.0
	1.840	2.191	276.7	-3.9	169.5
	1.825	2.198	267.8	-4.1	163.7
	1.826	2.198	267.2	-3.6	159.1
	1.839	2.205	269.5	-2.1	160.2
	1.845	2.208	270.6	-.1	162.8
	1.852	2.210	273.5	-.3	164.5
	1.858	2.207	278.1	.7	166.0
	1.865	2.222	279.7	1.5	166.7
	1.867	2.232	280.7	3.3	164.4
	1.865	2.232	279.3	1.3	156.8
	1.856	2.232	276.7	-.3	150.9
	1.856	2.240	276.2	0.0	148.9
	1.851	2.240	279.2	1.0	151.0
	1.841	2.231	276.8	-2.9	152.8
	1.846	2.233	275.5	-3.2	157.9
	1.875	2.243	277.1	-.3	163.1
	1.880	2.245	274.1	-.9	161.4
	1.879	2.245	270.0	-6.2	153.5
	1.876	2.246	272.0	-9.7	148.9
	1.865	2.249	274.5	-12.9	145.9
	1.849	2.248	275.0	-17.4	139.6
	1.850	2.246	279.1	-18.7	138.2
	1.855	2.249	282.9	-16.3	138.4
	1.853	2.253	280.7	-16.3	135.1
	1.854	2.250	278.2	-14.2	129.6
	1.859	2.253	276.9	-12.9	128.2
	1.853	2.262	273.5	-13.7	124.2
	1.836	2.258	268.6	-15.5	117.0
	1.819	2.252	267.5	-13.4	107.5
	1.806	2.248	269.0	-14.8	98.9
Overrun	1.790	2.239	275.8	-10.6	100.3
	1.791	2.226	272.5	-4.5	111.0

(Continued)

Table 3 (Continued)

Test No. 40; 25-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	2.173	2.421	293.9	3.0	112.5
	2.336	2.602	286.2	3.9	118.4
	2.361	2.637	274.3	-.9	99.6
	2.333	2.629	271.5	-3.0	114.2
	2.331	2.610	275.8	-1.9	111.6
	2.320	2.607	272.0	-.9	87.5
	2.314	2.611	271.5	-2.5	92.1
	2.324	2.619	269.3	-1.2	92.9
	2.329	2.617	269.7	.6	91.0
	2.336	2.616	267.8	2.1	92.2
	2.343	2.625	275.3	5.1	91.5
	2.343	2.624	276.8	3.0	87.7
	2.345	2.624	286.7	3.1	93.6
	2.356	2.627	291.1	5.1	96.1
	2.370	2.632	298.2	5.7	99.9
	2.370	2.629	295.7	4.4	99.9
	2.382	2.637	299.4	7.2	105.3
	2.384	2.642	288.7	8.2	106.9
	2.370	2.642	276.8	5.3	101.3
	2.364	2.647	265.7	4.7	102.5
	2.380	2.650	264.1	7.1	105.7
	2.377	2.646	263.3	7.7	107.1
	2.382	2.643	276.5	9.8	114.4
	2.405	2.653	287.8	14.5	125.7
	2.414	2.652	295.9	13.0	126.1
	2.408	2.651	294.3	9.8	118.0
	2.413	2.659	286.6	9.7	110.5
	2.411	2.671	280.0	8.0	107.2
	2.397	2.675	272.4	7.5	88.4
	2.376	2.672	266.0	8.3	85.6
	2.374	2.674	256.3	8.2	104.1
	2.365	2.675	259.9	6.8	98.3
	2.347	2.667	261.5	2.8	116.3
	2.331	2.655	272.4	1.2	144.9
	2.341	2.656	288.3	2.1	169.3
	2.345	2.655	304.6	4.8	198.3
	2.352	2.646	316.8	6.6	214.0
	2.369	2.646	319.3	7.9	218.3
	2.394	2.648	314.7	6.3	217.1
	2.382	2.641	299.1	3.6	203.9
	2.374	2.640	280.7	.9	193.4
	2.368	2.644	261.5	5.4	181.2
	2.349	2.645	248.0	4.2	173.7
	2.312	2.640	237.0	3.9	171.6
	2.297	2.640	239.7	6.8	164.3
	2.273	2.636	256.8	5.9	161.8
	2.253	2.621	283.0	-5.1	173.2
	2.257	2.621	305.0	-5.7	187.1
	2.263	2.626	314.7	-4.8	195.1
	2.258	2.619	314.5	-5.7	198.6
	2.269	2.621	303.9	-5.3	196.0
	2.261	2.632	284.0	-.1	184.5
	2.239	2.629	268.0	-.4	164.3
	2.224	2.624	261.0	-2.7	143.5
	2.220	2.630	259.2	-3.6	130.4
	2.204	2.622	259.4	-7.1	120.3
	2.198	2.608	264.5	-11.0	116.0
	2.199	2.608	270.1	-10.7	113.2
	2.189	2.607	277.8	-13.0	112.8
	2.180	2.601	283.9	-17.6	113.0
Test Lane	2.177	2.607	293.6	-16.2	116.6
	2.172	2.614	298.9	-13.8	116.5
	2.162	2.609	296.4	-15.0	114.7
	2.152	2.610	294.9	-13.8	112.8
	2.141	2.608	291.3	-13.9	107.4
	2.129	2.602	281.4	-14.8	100.8
	2.119	2.608	272.0	-18.6	100.8
	2.101	2.608	270.6	-18.3	104.8
	2.100	2.607	267.4	-21.4	106.0
	2.106	2.616	267.1	-21.4	107.9
	2.103	2.626	269.6	-20.6	106.7
	2.096	2.624	271.6	-21.4	98.2
	2.098	2.626	274.7	-20.8	92.4
	2.106	2.626	276.3	-14.8	93.8
	2.101	2.629	276.0	-13.0	95.0
	2.097	2.632	275.6	-16.5	99.2
	2.111	2.639	281.5	-14.1	105.0
	2.132	2.648	284.2	-15.9	104.8
	2.127	2.653	285.0	-23.0	99.6
	2.129	2.658	287.0	-24.4	99.9
	2.143	2.656	289.8	-18.9	101.6
	2.129	2.650	286.3	-19.4	100.9
	2.117	2.645	282.8	-22.1	101.1
	2.127	2.662	280.7	-19.1	105.0
	2.138	2.664	278.8	-18.3	105.0
	2.136	2.669	275.0	-21.1	102.7
	2.147	2.672	271.8	-23.2	104.6
	2.161	2.685	270.6	-22.1	107.6
	2.159	2.669	272.0	-22.3	108.3
	2.152	2.664	275.7	-22.9	108.6
	2.162	2.666	281.1	-21.2	108.4
	2.167	2.664	283.3	-18.6	106.4
	2.161	2.655	282.9	-16.7	105.1
	2.177	2.666	285.4	-13.9	105.1
	2.203	2.671	283.9	-10.9	106.9
	2.198	2.674	277.2	-10.4	107.2
	2.191	2.676	277.2	-10.6	107.4
	2.198	2.679	277.6	-13.3	105.5
	2.190	2.672	275.9	-17.0	102.0
	2.168	2.667	275.3	-21.5	97.6
	2.166	2.654	278.6	-20.2	101.5
	2.168	2.651	275.7	-15.4	106.5
	2.165	2.647	273.5	-13.3	109.5
	2.166	2.646	272.0	-11.8	110.4
	2.173	2.650	272.7	-9.7	109.8
	2.181	2.651	274.9	-12.4	105.7
	2.184	2.650	281.2	-18.8	102.9
	2.177	2.650	287.5	-17.3	105.5
	2.175	2.648	291.5	-16.5	110.0
	2.164	2.643	288.7	-15.9	112.1
	2.153	2.637	284.4	-17.6	111.2
Overrun	2.147	2.641	277.7	-17.6	107.1
	2.142	2.638	269.2	-17.4	100.3
	2.135	2.634	261.5	-18.8	92.4
	2.138	2.632	260.1	-19.4	88.6
	2.131	2.642	264.3	-21.1	82.8
	2.120	2.635	276.5	-20.6	84.0
	2.124	2.632	277.9	-22.9	96.1
	2.133	2.631	268.1	-19.2	106.7
	2.139	2.627	258.7	-17.7	103.7

(Continued)

Table 3 (Continued)

Test No. 41; 10-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	2.604	2.642	258.4	20.6	84.6
	2.581	2.633	259.3	16.2	78.5
	2.568	2.621	260.5	15.4	79.2
	2.573	2.615	272.9	17.5	85.8
	2.566	2.611	296.7	15.4	92.7
	2.563	2.603	301.4	15.9	105.9
	2.572	2.604	291.6	16.8	103.5
	2.553	2.598	272.5	16.8	101.6
	2.546	2.599	244.4	13.7	91.7
	2.540	2.599	223.5	10.9	87.2
	2.502	2.595	214.4	5.6	73.5
	2.484	2.601	222.2	5.6	80.9
	2.505	2.601	249.4	8.0	87.7
	2.521	2.593	287.3	8.6	102.3
	2.545	2.591	322.6	13.4	116.3
	2.602	2.598	347.2	20.0	127.6
	2.625	2.589	350.5	21.9	129.5
	2.619	2.587	325.3	17.5	121.9
	2.604	2.595	289.1	16.5	109.0
	2.576	2.598	252.2	13.9	93.1
	2.528	2.592	223.4	10.7	86.7
	2.513	2.584	212.6	7.8	86.5
	2.498	2.590	224.6	11.8	94.6
	2.501	2.585	248.0	15.1	105.2
	2.534	2.591	279.2	16.2	119.9
	2.573	2.595	310.9	19.2	129.5
	2.598	2.604	330.1	22.1	138.3
	2.624	2.609	336.1	24.0	144.2
	2.641	2.614	329.4	27.2	148.4
	2.624	2.615	307.8	26.8	144.9
	2.600	2.619	271.4	21.2	132.1
	2.576	2.634	236.9	17.7	120.0
	2.545	2.632	212.3	13.7	104.9
	2.512	2.632	200.4	4.5	91.7
	2.505	2.633	207.3	-1.2	91.3
	2.521	2.645	237.1	.3	103.1
	2.542	2.639	279.3	1.2	126.4
	2.583	2.636	319.0	-2.4	147.2
	2.620	2.639	344.1	-1.5	169.5
	2.637	2.642	351.8	4.6	181.3
	2.622	2.627	342.0	4.3	178.2
	2.608	2.626	318.4	1.5	170.4
	2.581	2.630	289.2	3.0	156.5
	2.545	2.636	263.9	6.0	137.8
	2.511	2.625	244.2	2.7	122.2
	2.507	2.636	234.7	-.1	112.7
	2.491	2.641	229.9	.6	100.9
	2.475	2.634	231.3	-3.7	92.2
	2.491	2.626	241.1	-9.6	90.3
	2.514	2.631	261.5	-11.5	92.7
	2.513	2.621	280.0	-14.0	94.8
	2.524	2.618	293.9	-15.7	99.8
	2.547	2.624	304.9	-11.9	108.0
	2.540	2.621	309.1	-11.8	109.2
	2.529	2.616	302.4	-14.3	106.8
	2.523	2.626	293.1	-13.9	104.5
	2.518	2.621	286.0	-13.6	99.7
	2.485	2.608	276.5	-19.8	89.4
	2.477	2.607	270.9	-22.5	84.7
	2.472	2.617	269.8	-22.2	80.8
Test Lane	2.468	2.600	268.3	-23.9	77.1
	2.455	2.596	267.8	-29.2	75.2
	2.462	2.604	272.5	-26.8	78.5
	2.451	2.593	277.0	-25.9	79.0
	2.433	2.579	279.1	-26.3	80.2
	2.438	2.584	282.1	-26.2	81.3
	2.442	2.579	283.4	-22.7	81.3
	2.428	2.574	281.1	-21.8	80.4
	2.434	2.587	276.9	-19.3	80.9
	2.444	2.589	273.9	-19.6	79.4
	2.430	2.585	270.3	-19.5	74.7
	2.426	2.592	271.2	-18.1	73.3
	2.436	2.596	275.7	-16.9	74.2
	2.430	2.588	278.6	-18.4	75.9
	2.436	2.595	277.5	-15.6	82.0
	2.438	2.600	277.0	-12.7	88.6
	2.443	2.595	274.6	-14.0	87.9
	2.448	2.594	272.4	-16.6	83.9
	2.448	2.592	271.8	-17.1	81.1
	2.440	2.585	273.4	-18.6	76.6
	2.449	2.584	275.9	-13.7	78.0
	2.449	2.582	280.9	-19.3	84.1
	2.451	2.580	281.0	-18.9	87.0
	2.462	2.587	280.5	-16.3	89.1
	2.462	2.593	281.4	-14.8	90.8
	2.444	2.587	279.3	-14.8	86.7
	2.437	2.587	275.9	-15.6	81.6
	2.442	2.590	274.2	-14.3	80.4
	2.436	2.582	271.0	-13.7	80.2
	2.457	2.584	271.2	-16.0	80.2
	2.480	2.593	270.8	-13.7	79.5
	2.482	2.601	270.8	-11.5	78.2
	2.480	2.607	270.6	-10.4	79.9
	2.484	2.616	274.2	-11.8	79.0
	2.468	2.614	275.9	-10.0	77.6
	2.462	2.614	280.5	-12.8	81.3
	2.469	2.612	281.3	-11.5	86.0
	2.465	2.607	280.4	-15.4	83.5
	2.464	2.616	278.5	-17.5	80.1
	2.475	2.628	277.4	-16.0	81.1
	2.475	2.629	273.2	-14.0	82.0
	2.478	2.634	272.3	-18.6	79.7
	2.488	2.640	273.0	-16.3	79.7
	2.493	2.634	276.7	-14.0	80.8
	2.478	2.622	278.9	-16.0	79.4
	2.480	2.625	280.0	-19.5	77.6
	2.487	2.631	280.0	-16.5	78.3
	2.480	2.633	280.4	-15.9	75.9
	2.470	2.635	277.6	-16.8	74.0
	2.481	2.647	275.8	-20.0	72.4
	2.487	2.650	275.1	-18.0	69.0
	2.478	2.640	272.3	-17.8	64.3
	2.486	2.637	270.1	-17.5	65.5
	2.502	2.640	268.4	-16.9	69.8
	2.496	2.639	266.2	-15.4	70.9
	2.487	2.633	263.8	-16.6	69.5
	2.482	2.638	264.5	-17.5	69.0
	2.470	2.640	262.5	-16.8	65.7
Overrun	2.455	2.630	256.8	-18.0	63.8
	2.464	2.618	253.4	-16.9	69.5

(Continued)

Table 3 (Continued)

Test No. 42; 5-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	2.611	2.651	295.2	17.8	111.8
	2.662	2.686	282.0	16.3	100.1
	2.668	2.666	277.3	20.1	99.2
	2.653	2.660	268.0	21.0	87.8
	2.641	2.674	247.4	19.9	81.4
	2.623	2.675	215.8	16.0	72.9
	2.600	2.682	215.1	13.3	73.6
	2.599	2.691	228.2	12.3	80.7
	2.599	2.684	252.1	11.4	92.3
	2.611	2.679	276.7	8.1	100.2
	2.637	2.679	301.5	9.4	109.1
	2.675	2.684	322.4	16.2	119.6
	2.681	2.672	329.6	18.7	123.4
	2.680	2.669	319.9	17.7	122.2
	2.690	2.671	300.9	23.2	122.9
	2.672	2.671	275.1	25.7	113.2
	2.628	2.655	254.2	19.3	103.3
	2.606	2.658	237.6	13.6	98.9
	2.601	2.665	237.0	12.7	98.7
	2.574	2.655	251.5	9.9	97.1
	2.586	2.652	273.6	9.0	110.1
	2.607	2.654	294.0	11.7	122.0
	2.625	2.656	308.1	17.4	126.5
	2.639	2.645	308.0	20.8	125.1
	2.662	2.650	295.5	22.5	121.5
	2.657	2.646	281.8	22.9	110.8
	2.656	2.642	263.7	22.6	102.7
	2.645	2.629	255.8	20.1	97.8
	2.644	2.631	258.1	17.4	97.6
	2.617	2.624	264.1	12.1	98.5
	2.603	2.624	265.8	7.5	103.3
	2.596	2.630	272.3	6.0	104.7
	2.592	2.632	275.1	6.0	107.1
	2.579	2.625	272.9	3.9	106.8
	2.579	2.628	272.8	3.1	108.4
	2.584	2.628	278.2	5.1	108.5
	2.586	2.627	280.8	6.4	107.5
	2.580	2.622	282.9	3.3	106.6
	2.580	2.634	286.3	1.6	107.7
	2.594	2.633	286.7	2.2	105.6
	2.601	2.630	282.9	.3	105.4
	2.601	2.634	285.6	-3.0	106.5
	2.595	2.641	283.0	-2.7	103.5
	2.580	2.633	274.2	-.9	99.9
	2.563	2.640	264.1	3.0	94.5
	2.550	2.639	258.2	3.6	84.2
	2.525	2.634	249.0	-.4	71.7
	2.530	2.649	251.1	-5.2	65.5
	2.545	2.656	265.2	-10.2	60.3
	2.546	2.651	285.9	-20.7	57.9
	2.553	2.656	303.5	-27.8	59.9
	2.585	2.666	315.6	-25.0	66.7
	2.591	2.654	316.5	-24.0	67.9
	2.586	2.649	306.1	-24.7	67.4
	2.593	2.655	289.8	-21.6	67.4
	2.592	2.666	273.9	-16.6	64.4
	2.572	2.661	260.3	-18.1	57.0
	2.560	2.666	252.2	-20.4	52.7
	2.566	2.678	252.3	-20.7	51.5
	2.556	2.676	255.0	-23.1	47.7
Test Lane	2.544	2.661	257.5	-28.2	45.8
	2.544	2.661	267.4	-31.4	46.8
	2.555	2.666	280.4	-32.3	49.2
	2.553	2.659	291.9	-34.1	48.9
	2.554	2.661	299.4	-33.2	50.8
	2.571	2.674	302.2	-33.3	56.3
	2.587	2.681	298.0	-31.2	59.4
	2.582	2.676	288.4	-27.2	58.9
	2.566	2.674	276.4	-27.5	58.2
	2.571	2.685	266.7	-30.0	58.7
	2.570	2.690	262.7	-27.8	53.2
	2.565	2.690	259.3	-30.5	46.8
	2.565	2.688	263.3	-33.0	45.1
	2.590	2.693	268.1	-30.0	47.8
	2.602	2.692	274.3	-28.5	48.5
	2.592	2.685	278.0	-30.6	49.6
	2.584	2.680	285.0	-30.2	52.3
	2.593	2.690	288.2	-30.0	55.5
	2.581	2.688	289.2	-33.0	53.5
	2.569	2.677	286.1	-34.4	52.2
	2.571	2.679	283.2	-32.0	54.9
	2.578	2.684	278.6	-30.3	57.9
	2.569	2.671	271.0	-32.7	55.5
	2.549	2.669	264.1	-33.0	52.9
	2.552	2.668	265.1	-31.1	50.6
	2.545	2.662	270.9	-32.4	47.2
	2.531	2.651	272.9	-34.2	44.6
	2.531	2.653	274.4	-33.9	47.0
	2.548	2.654	279.5	-30.3	51.5
	2.545	2.649	279.1	-30.9	51.3
	2.553	2.652	274.9	-30.2	53.0
	2.559	2.651	274.7	-27.8	51.3
	2.561	2.651	276.2	-27.9	45.9
	2.565	2.655	279.7	-29.6	44.0
	2.567	2.665	281.0	-26.0	46.8
	2.558	2.651	282.4	-27.0	44.7
	2.553	2.650	281.6	-26.9	45.3
	2.551	2.650	282.9	-26.7	47.5
	2.540	2.641	278.5	-26.9	44.2
	2.525	2.632	275.7	-28.8	43.5
	2.542	2.643	273.0	-26.0	47.5
	2.535	2.640	271.2	-26.9	48.4
	2.522	2.634	269.3	-27.2	48.0
	2.532	2.634	269.3	-27.0	52.2
	2.544	2.633	273.6	-26.1	53.2
	2.517	2.619	275.6	-31.2	49.6
	2.524	2.625	282.0	-31.7	50.8
	2.538	2.625	285.4	-29.3	52.7
	2.519	2.624	283.8	-29.6	51.6
	2.517	2.626	278.2	-32.1	51.8
	2.537	2.643	277.1	-28.2	53.0
Overrun	2.536	2.639	273.1	-28.2	50.1
	2.522	2.639	268.7	-28.2	49.7
	2.539	2.645	273.5	-26.1	52.9
	2.535	2.645	279.3	-24.9	51.8
	2.536	2.636	281.1	-26.0	50.3
	2.554	2.651	280.9	-21.1	53.7
	2.565	2.665	275.3	-16.2	56.7
	2.563	2.656	257.0	-13.3	54.4
	2.565	2.653	241.0	-7.5	56.0

(Continued)

Table 3 (Continued)

Test No. 43; 15-deg yaw angle

V_w m/sec	V_c m/sec	W N	B N	S N	
1.213	1.278	276.9	5.9	81.0	Approach
1.242	1.304	280.5	6.4	82.1	
1.252	1.321	286.8	6.0	84.3	
1.259	1.329	278.5	6.6	92.5	
1.258	1.330	275.7	5.2	91.3	
1.255	1.332	268.9	5.6	83.9	
1.246	1.330	268.1	6.9	87.8	
1.252	1.330	269.2	8.3	95.2	
1.252	1.336	275.3	6.3	84.8	
1.258	1.339	279.8	9.0	81.4	
1.261	1.345	283.0	10.3	92.3	
1.262	1.346	272.7	9.6	91.7	
1.270	1.351	267.2	9.6	79.4	
1.271	1.350	267.5	11.8	81.6	
1.277	1.357	279.9	12.0	94.0	
1.275	1.347	283.7	10.2	93.7	
1.279	1.350	286.5	13.1	89.4	
1.268	1.352	279.8	9.2	87.8	
1.275	1.354	275.0	7.5	89.1	
1.275	1.347	268.9	7.1	86.0	
1.277	1.353	271.2	8.2	84.4	
1.279	1.347	273.6	3.0	80.7	
1.289	1.344	277.8	5.5	86.8	
1.278	1.338	274.3	6.9	87.4	
1.274	1.341	274.1	6.0	84.4	
1.273	1.341	275.6	4.9	82.0	
1.278	1.348	276.6	8.2	94.3	
1.273	1.347	273.1	8.6	98.7	
1.274	1.350	275.2	9.0	101.1	
1.276	1.344	271.7	10.6	111.1	
1.280	1.341	267.0	12.9	130.9	
1.264	1.333	271.1	12.0	144.6	
1.270	1.339	279.7	12.9	162.7	
1.268	1.335	277.9	11.6	175.4	
1.274	1.347	275.9	11.0	180.7	
1.276	1.351	278.6	9.3	180.3	
1.289	1.353	276.5	9.8	180.6	
1.280	1.348	276.3	8.7	177.2	
1.277	1.347	279.4	8.6	179.1	
1.275	1.342	279.2	7.7	184.4	
1.260	1.335	276.6	6.9	188.4	
1.261	1.342	278.8	7.2	190.8	
1.256	1.345	275.4	3.8	188.6	
1.258	1.356	275.3	2.1	181.7	
1.249	1.356	278.2	-.1	169.9	
1.261	1.367	280.5	-.8	160.5	
1.235	1.359	277.9	-6.2	148.0	
1.234	1.355	280.4	-4.9	141.5	
1.217	1.349	278.1	-8.2	137.3	
1.215	1.353	277.8	-7.9	136.9	
1.206	1.348	275.3	-9.9	135.3	
1.217	1.352	276.3	-9.2	135.7	
1.218	1.353	275.6	-11.0	136.6	
1.222	1.350	277.2	-9.4	137.6	
1.218	1.345	278.1	-11.0	139.2	
1.215	1.344	278.8	-10.6	139.7	
1.217	1.344	274.6	-9.7	140.6	
1.216	1.347	273.1	-10.5	138.8	
1.227	1.356	276.0	-8.3	138.6	
1.224	1.356	275.6	-8.7	136.9	
1.230	1.361	277.6	-9.0	136.7	Test Lane
1.227	1.359	281.1	-9.8	134.6	
1.235	1.347	281.7	-7.3	136.1	
1.219	1.337	277.2	-10.2	133.7	
1.237	1.343	277.6	-8.2	134.6	
1.223	1.334	275.3	-10.0	133.0	
1.232	1.344	277.0	-9.0	137.1	
1.217	1.347	276.2	-10.3	136.3	
1.230	1.356	280.4	-9.2	141.3	
1.213	1.347	279.5	-10.4	139.6	
1.227	1.362	279.8	-9.8	141.7	
1.210	1.347	276.0	-10.8	136.2	
1.224	1.359	277.6	-10.1	137.7	
1.218	1.351	276.0	-10.0	134.2	
1.221	1.356	276.0	-10.1	134.7	
1.210	1.347	276.2	-9.9	132.9	
1.221	1.359	279.5	-9.3	134.9	
1.208	1.356	281.5	-12.0	131.4	
1.213	1.365	285.2	-10.9	131.9	
1.216	1.362	279.4	-9.9	132.7	
1.219	1.360	275.0	-9.5	131.2	
1.215	1.355	273.0	-10.4	131.2	
1.228	1.354	274.3	-8.2	132.7	
1.226	1.352	273.3	-8.9	134.3	
1.227	1.356	279.1	-11.2	133.2	
1.231	1.361	283.4	-10.1	136.6	
1.236	1.368	282.4	-10.1	138.1	
1.238	1.370	278.6	-9.6	138.7	
1.235	1.367	275.9	-11.3	134.9	
1.242	1.373	275.9	-8.3	136.9	
1.244	1.373	276.6	-9.9	133.7	
1.241	1.367	279.2	-12.0	131.4	
1.231	1.363	280.5	-11.6	128.2	
1.229	1.360	280.4	-11.6	126.4	
1.221	1.355	279.2	-13.8	123.4	
1.215	1.355	277.5	-13.8	122.4	
1.223	1.355	277.5	-11.2	124.0	
1.225	1.359	278.3	-13.1	124.8	
1.229	1.364	278.5	-12.0	127.8	
1.227	1.364	278.5	-13.2	127.4	
1.224	1.361	278.9	-13.8	127.9	
1.218	1.362	280.8	-16.6	125.4	
1.213	1.359	277.0	-15.5	125.5	
1.217	1.362	272.8	-15.3	124.3	
1.222	1.359	270.5	-15.6	120.5	
1.228	1.361	272.5	-17.4	117.0	
1.232	1.360	273.6	-14.6	118.0	
1.234	1.363	275.7	-17.1	116.5	
1.226	1.360	279.8	-18.9	115.7	
1.224	1.360	280.7	-18.1	116.7	
1.228	1.362	279.2	-17.3	118.0	
1.223	1.360	276.5	-18.3	112.5	
1.221	1.357	275.0	-18.1	110.8	
1.224	1.358	275.7	-17.0	109.0	
1.221	1.354	277.8	-18.8	109.0	
1.229	1.360	279.5	-16.2	114.5	
1.229	1.356	277.8	-13.6	123.5	
1.240	1.363	278.8	-12.7	131.7	
1.240	1.357	271.0	-8.2	136.3	
1.243	1.365	257.2	-4.1	135.1	Overrun

(Continued)

Table 3 (Continued)

Test No. 44; 25-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	1.097	1.284	288.6	9.9	62.3
	1.102	1.310	287.1	9.7	54.4
	1.114	1.331	288.7	10.0	42.8
	1.128	1.339	285.1	10.7	38.0
	1.125	1.343	281.1	9.6	49.3
	1.132	1.353	275.7	12.8	55.2
	1.124	1.345	268.3	12.7	44.8
	1.118	1.348	261.6	13.2	47.9
	1.108	1.348	264.5	13.5	52.0
	1.128	1.355	271.6	14.8	56.9
	1.127	1.348	280.1	11.8	54.5
	1.154	1.353	286.4	15.1	56.0
	1.159	1.348	285.5	13.4	60.5
	1.160	1.352	282.1	14.3	62.9
	1.157	1.351	279.2	14.5	57.5
	1.145	1.353	275.3	13.4	48.5
	1.146	1.359	274.1	15.1	54.7
	1.152	1.361	275.6	12.4	57.4
	1.167	1.368	273.2	12.4	57.8
	1.161	1.363	272.4	12.8	46.4
	1.179	1.369	274.8	17.1	51.4
	1.179	1.365	276.9	13.1	57.2
	1.187	1.366	280.2	16.8	64.8
	1.171	1.358	281.6	14.8	57.3
	1.176	1.362	277.0	16.0	56.7
	1.165	1.360	272.1	15.0	61.5
	1.169	1.363	272.4	16.7	70.9
	1.157	1.361	272.8	15.4	69.3
	1.174	1.366	277.0	20.6	72.3
	1.174	1.369	277.3	20.3	84.1
	1.183	1.369	276.9	21.4	96.9
	1.168	1.363	272.1	18.7	98.3
	1.173	1.369	271.1	22.5	106.1
	1.157	1.366	270.2	18.3	120.7
	1.157	1.366	277.2	18.6	135.7
	1.146	1.361	282.1	15.6	138.4
	1.150	1.365	285.5	19.7	140.0
	1.142	1.362	281.7	16.4	140.0
	1.134	1.360	279.2	16.5	139.9
	1.120	1.360	276.9	12.9	133.6
	1.117	1.361	275.4	14.5	130.9
	1.100	1.360	273.8	10.7	125.2
	1.094	1.359	274.1	10.1	119.7
	1.097	1.359	273.1	8.3	114.9
	1.097	1.354	271.8	10.5	113.2
	1.100	1.357	276.2	10.3	116.4
	1.112	1.354	279.5	10.1	121.0
	1.108	1.355	284.5	10.4	124.1
	1.097	1.359	286.7	10.3	125.5
	1.091	1.362	284.0	9.9	124.7
	1.084	1.364	278.9	8.0	117.6
	1.079	1.367	274.0	6.2	109.6
	1.074	1.366	270.8	5.9	105.8
	1.068	1.361	271.3	4.7	102.9
	1.076	1.363	277.8	3.5	101.8
	1.078	1.360	280.5	1.7	99.6
	1.083	1.363	282.7	2.6	98.3
	1.091	1.369	279.4	-.5	92.5
	1.103	1.372	278.5	1.0	88.5
	1.089	1.370	274.7	-1.5	83.5
Test Lane	1.090	1.375	274.7	1.2	82.5
	1.083	1.366	275.3	-.5	79.6
	1.088	1.367	279.2	.2	83.4
	1.090	1.367	281.7	-.3	84.9
	1.095	1.375	281.9	-.0	87.3
	1.090	1.373	279.2	-1.9	88.0
	1.097	1.380	280.2	-.3	91.5
	1.089	1.356	278.8	.3	90.5
	1.079	1.358	273.4	-.0	89.9
	1.088	1.356	271.3	1.8	89.3
	1.088	1.356	270.0	1.4	86.3
	1.083	1.355	269.3	1.1	84.3
	1.084	1.380	271.8	1.4	85.0
	1.089	1.381	277.9	2.0	87.9
	1.081	1.378	282.9	1.2	89.6
	1.089	1.381	288.0	2.8	94.6
	1.094	1.378	284.9	3.0	95.6
	1.099	1.378	279.8	1.9	94.6
	1.099	1.375	275.6	2.1	90.3
	1.090	1.375	274.4	2.2	90.1
	1.078	1.369	273.7	1.5	87.3
	1.074	1.374	278.1	1.3	88.6
	1.073	1.375	281.3	1.3	90.3
	1.080	1.374	283.6	1.1	92.6
	1.098	1.378	282.6	2.1	91.9
	1.091	1.376	278.6	.4	91.4
	1.086	1.372	276.7	.9	90.5
	1.081	1.366	275.6	.2	88.4
	1.087	1.371	274.8	.6	89.3
	1.081	1.367	275.9	.3	88.9
	1.096	1.376	280.1	2.2	89.8
	1.089	1.375	280.7	1.7	89.1
	1.090	1.381	282.0	3.0	90.8
	1.078	1.377	280.4	.6	88.1
	1.086	1.381	281.6	1.4	90.6
	1.079	1.373	280.7	1.0	89.8
	1.100	1.381	277.8	1.1	94.5
	1.101	1.378	276.2	1.1	93.3
	1.106	1.381	277.3	2.1	95.6
	1.097	1.375	274.8	1.2	96.3
	1.104	1.383	277.0	.6	100.1
	1.100	1.381	282.4	.7	97.6
	1.105	1.382	281.3	.8	101.4
	1.109	1.379	283.0	3.2	103.0
	1.106	1.379	280.1	2.6	98.4
	1.112	1.381	275.0	4.4	95.4
	1.105	1.376	271.5	3.5	93.8
	1.102	1.379	274.1	3.8	92.4
	1.099	1.381	272.7	3.3	91.8
	1.100	1.384	277.3	4.3	96.9
	1.100	1.378	278.5	2.0	99.9
	1.102	1.384	279.2	2.6	100.1
	1.098	1.380	276.0	2.2	97.9
	1.090	1.378	275.3	.2	95.1
	1.097	1.378	273.8	-.8	90.9
	1.093	1.375	275.7	-1.5	87.4
	1.096	1.375	278.1	-.2	89.0
	1.079	1.371	277.5	-4.0	86.3
	1.078	1.366	275.1	-1.2	86.0
Overrun	1.064	1.361	268.7	.6	86.3

(Continued)

Table 3 (Continued)

Test No. 45, 40-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	.871	1.261	186.1	-3.5	69.2
	.886	1.284	177.3	-.9	68.6
	.891	1.296	176.3	2.0	58.9
	.882	1.305	181.0	2.4	50.3
	.891	1.320	184.6	5.8	47.3
	.895	1.318	189.2	4.6	56.9
	.891	1.317	192.2	3.7	56.0
	.897	1.329	194.9	3.7	55.3
	.912	1.334	190.3	2.6	59.4
	.920	1.330	189.2	.8	62.7
	.924	1.331	187.5	1.2	59.0
	.934	1.330	193.8	4.3	57.8
	.928	1.321	198.1	2.2	61.2
	.935	1.323	204.1	2.8	67.2
	.937	1.326	195.3	2.9	68.4
	.937	1.326	189.0	4.9	66.2
	.925	1.328	185.2	4.4	58.7
	.924	1.336	182.9	3.3	54.5
	.918	1.331	180.4	3.6	55.7
	.925	1.331	178.9	4.3	55.6
	.932	1.337	183.5	3.0	52.4
	.936	1.334	188.0	1.4	49.8
	.946	1.333	189.9	4.0	61.1
	.956	1.343	194.9	5.0	68.1
	.944	1.340	200.7	3.0	67.5
	.942	1.334	199.5	6.3	61.4
	.951	1.335	192.1	8.5	63.2
	.936	1.326	186.8	5.3	64.6
	.932	1.320	185.5	5.2	66.7
	.931	1.323	190.3	5.9	73.4
	.917	1.324	185.6	3.8	88.0
	.916	1.330	184.9	2.8	109.5
	.928	1.333	184.2	4.6	126.7
	.929	1.333	184.9	4.7	135.6
	.935	1.333	185.5	9.5	141.6
	.942	1.327	191.5	12.6	148.9
	.936	1.321	194.3	15.4	156.0
	.932	1.327	193.5	17.1	157.8
	.920	1.326	187.5	17.6	156.9
	.915	1.327	183.3	13.6	153.4
	.920	1.333	181.7	10.8	157.1
	.922	1.333	182.1	9.4	161.7
	.919	1.330	188.0	9.6	167.5
	.920	1.331	194.0	8.1	168.2
	.921	1.328	196.5	9.6	173.1
	.913	1.325	198.2	10.6	175.6
	.908	1.330	198.2	9.6	176.3
	.898	1.329	192.2	6.9	172.2
	.898	1.332	185.6	8.2	171.4
	.888	1.334	181.8	6.6	167.8
	.893	1.335	179.2	5.6	165.4
	.902	1.339	182.9	9.0	169.0
	.902	1.335	187.4	8.4	172.8
	.903	1.332	192.1	7.5	174.4
	.912	1.340	194.3	7.5	177.2
	.898	1.337	192.2	6.3	174.6
	.895	1.339	187.0	1.8	165.5
	.903	1.343	183.7	.1	156.2
	.895	1.342	183.3	.7	149.6
	.881	1.337	183.3	-.3	142.6
Test Lane	.883	1.341	188.3	-2.2	140.1
	.871	1.335	192.7	-3.2	138.5
	.857	1.334	195.0	-4.5	137.6
	.861	1.335	193.0	-7.8	133.4
	.863	1.337	192.4	-9.2	125.6
	.862	1.338	190.8	-8.2	120.6
	.846	1.333	189.6	-10.2	112.9
	.848	1.334	188.1	-7.6	111.0
	.843	1.334	189.0	-6.7	111.7
	.838	1.332	189.6	-7.3	116.0
	.844	1.334	188.7	-10.2	117.7
	.855	1.335	185.9	-9.3	119.8
	.864	1.343	185.4	-10.0	121.1
	.864	1.346	186.2	-11.0	118.1
	.857	1.346	185.5	-11.9	113.1
	.849	1.345	187.8	-8.3	110.0
	.837	1.348	189.7	-9.2	108.3
	.834	1.343	193.0	-8.7	105.8
	.829	1.340	192.8	-9.8	106.1
	.835	1.347	191.6	-4.8	111.2
	.838	1.351	187.3	-7.3	113.3
	.839	1.343	184.3	-7.7	113.8
	.839	1.343	183.3	-9.5	113.6
	.839	1.342	181.8	-8.5	112.8
	.840	1.338	185.6	-12.3	111.3
	.830	1.335	188.7	-10.7	110.4
	.836	1.340	193.0	-10.5	111.8
	.823	1.337	191.6	-10.3	110.6
	.815	1.332	190.6	-10.4	108.1
	.818	1.334	188.7	-7.4	106.1
	.829	1.334	187.1	-13.9	100.3
	.830	1.336	185.4	-11.7	96.2
	.831	1.334	184.0	-13.1	92.8
	.835	1.339	187.3	-12.3	94.1
	.830	1.337	189.6	-16.3	93.3
	.826	1.338	193.4	-10.7	97.2
	.820	1.340	190.9	-11.3	99.8
	.824	1.340	193.0	-11.7	100.1
	.829	1.343	192.5	-12.8	100.8
	.814	1.339	186.8	-11.4	99.9
	.810	1.336	184.6	-11.9	99.8
	.817	1.337	189.2	-11.5	101.5
	.828	1.334	187.0	-11.1	103.8
	.834	1.339	186.1	-9.4	106.7
	.844	1.343	188.3	-11.6	107.0
	.852	1.349	186.8	-10.8	107.4
	.847	1.351	184.9	-13.7	105.9
	.822	1.355	185.5	-15.0	103.2
	.811	1.354	185.6	-15.7	99.4
	.811	1.351	187.7	-13.4	97.6
	.802	1.352	190.0	-15.1	95.2
	.792	1.349	191.5	-15.0	92.4
	.803	1.357	190.5	-12.3	96.1
Overrun	.798	1.351	191.1	-14.8	96.9
	.784	1.351	186.7	-16.9	98.9
	.784	1.349	183.6	-15.4	102.1
	.790	1.346	180.1	-14.9	103.7
	.792	1.343	180.7	-16.5	103.0
	.797	1.346	178.0	-15.6	99.4
	.801	1.346	181.8	-13.7	95.3

(Continued)

Table 3 (Continued)

Test No. 46; 65-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	.408	1.157	172.3	4.3	49.8
	.430	1.218	174.2	2.0	53.2
	.426	1.224	171.6	1.6	62.1
	.410	1.220	178.9	1.8	55.4
	.390	1.209	180.6	-1.9	55.1
	.385	1.206	184.3	-.5	53.5
	.395	1.215	187.3	4.9	51.1
	.409	1.219	187.9	6.3	51.7
	.429	1.233	180.2	5.9	57.2
	.449	1.241	178.3	5.7	65.6
	.456	1.249	183.3	4.7	67.6
	.446	1.243	176.6	2.4	60.7
	.435	1.241	174.5	2.7	50.6
	.420	1.235	178.5	4.2	45.2
	.404	1.236	184.1	4.6	49.3
	.400	1.234	178.3	3.8	57.0
	.402	1.237	180.6	3.1	61.6
	.399	1.242	186.2	3.6	58.4
	.393	1.245	188.4	5.1	54.1
	.399	1.243	183.7	6.4	55.2
	.417	1.249	180.4	6.4	63.8
	.429	1.253	184.6	5.2	75.0
	.445	1.256	180.1	6.2	84.8
	.439	1.251	183.1	5.5	86.1
	.439	1.253	187.3	6.9	87.1
	.428	1.254	199.7	11.4	91.6
	.423	1.261	195.4	13.2	95.7
	.412	1.254	193.9	10.5	104.2
	.419	1.251	190.0	9.4	114.5
	.442	1.256	187.8	9.3	119.8
	.460	1.259	181.5	8.2	115.3
	.453	1.246	184.1	5.9	115.1
	.445	1.240	181.1	5.4	119.3
	.444	1.252	181.2	7.0	127.3
	.430	1.258	182.2	7.8	132.5
	.411	1.251	181.1	5.2	136.3
	.403	1.253	179.5	5.8	137.4
	.413	1.266	185.6	8.4	140.6
	.409	1.265	191.9	8.6	143.1
	.400	1.259	185.9	5.1	142.3
	.393	1.259	189.1	5.4	145.9
	.403	1.270	191.4	6.2	153.8
	.407	1.273	188.9	5.6	156.9
	.412	1.271	185.0	3.9	160.0
	.425	1.273	186.0	4.2	164.9
	.429	1.273	189.5	3.0	166.5
	.436	1.271	185.7	2.1	164.4
	.427	1.271	183.3	1.2	166.8
	.417	1.271	178.0	.1	165.5
	.400	1.271	182.1	-.3	163.4
	.394	1.278	176.9	-1.1	162.7
	.374	1.278	177.0	-1.2	161.6
	.359	1.270	172.8	-2.8	157.2
	.366	1.278	183.1	-.6	155.8
	.368	1.282	194.8	-1.2	153.4
	.347	1.269	189.5	-5.3	147.7
	.359	1.275	192.3	-6.3	146.3
	.374	1.285	197.5	-4.4	145.5
	.356	1.276	194.3	-8.7	140.6
	.365	1.276	182.0	-7.4	138.4
Test Lane	.378	1.288	181.7	-8.1	138.3
	.349	1.279	182.4	-10.8	134.6
	.339	1.284	187.6	-9.6	133.7
	.333	1.289	176.6	-9.7	134.8
	.308	1.285	178.5	-13.7	134.0
	.300	1.285	185.0	-12.5	136.9
	.310	1.295	192.0	-11.3	141.4
	.303	1.283	185.6	-12.0	143.6
	.310	1.288	187.3	-10.4	148.8
	.318	1.293	193.2	-9.0	153.0
	.320	1.288	192.9	-4.7	155.8
	.324	1.288	184.4	-4.3	160.2
	.331	1.290	179.6	-6.9	162.4
	.342	1.291	183.1	-6.8	165.4
	.357	1.291	183.9	-5.0	168.5
	.371	1.294	180.8	-9.8	169.9
	.379	1.293	182.0	-10.0	170.6
	.381	1.293	189.5	-9.5	170.7
	.378	1.296	200.0	-9.2	167.8
	.360	1.294	198.0	-9.9	165.4
	.340	1.294	193.0	-10.9	160.2
	.332	1.301	196.1	-10.3	154.7
	.309	1.301	196.1	-10.4	148.9
	.297	1.300	183.6	-10.7	147.8
	.296	1.305	179.0	-12.3	146.2
	.280	1.301	182.5	-14.1	144.7
	.276	1.296	187.1	-12.5	145.1
	.290	1.301	185.0	-12.3	147.0
	.284	1.293	183.3	-13.6	143.3
	.292	1.293	189.8	-14.2	143.1
	.308	1.295	191.9	-10.9	144.5
	.308	1.286	184.3	-12.3	145.2
	.316	1.293	181.2	-12.1	148.1
	.312	1.295	184.9	-13.0	150.3
	.302	1.294	183.3	-9.6	152.3
	.300	1.302	182.0	-11.9	156.1
	.283	1.303	178.6	-13.0	156.7
	.279	1.301	182.1	-12.4	159.1
	.287	1.306	188.1	-10.1	163.6
	.288	1.298	189.4	-11.7	166.2
	.295	1.294	185.7	-9.8	166.2
	.305	1.297	191.1	-9.9	166.7
	.296	1.293	191.4	-10.6	163.5
	.298	1.292	185.7	-12.3	159.0
	.298	1.298	180.8	-11.6	154.9
	.284	1.298	179.5	-15.4	150.5
	.288	1.303	182.1	-15.5	146.6
	.282	1.302	184.6	-13.1	144.8
	.264	1.300	180.2	-14.1	144.6
	.260	1.307	184.3	-17.0	146.6
	.241	1.301	188.1	-13.2	143.6
	.223	1.297	188.8	-12.8	142.3
Overrun	.216	1.298	179.8	-15.0	141.9
	.205	1.298	181.5	-14.5	136.2
	.203	1.298	185.2	-9.7	126.8
	.191	1.302	186.5	-12.9	110.3
	.159	1.303	176.9	-14.5	89.8
	.119	1.306	183.4	-17.1	67.7
	.062	1.298	191.1	-17.6	49.1
	-.000	1.291	191.7	-20.4	35.0

(Continued)

Table 3 (Continued)

Test No. 47; 85-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	-.016	1.143	178.0	.2	41.9
	-.011	1.228	183.7	5.7	41.1
	-.002	1.238	188.2	9.4	47.4
	.013	1.250	195.9	12.9	52.7
	.030	1.257	198.3	15.1	60.4
	.036	1.258	199.5	17.1	67.6
	.035	1.252	195.0	14.6	70.3
	.022	1.249	192.6	12.8	64.3
	.004	1.242	186.6	7.7	55.8
	-.012	1.231	187.9	7.5	51.4
	-.025	1.224	185.7	8.9	52.1
	-.028	1.222	185.0	8.9	54.6
	-.023	1.222	184.6	10.7	57.1
	-.021	1.222	187.5	13.4	58.8
	-.020	1.227	187.4	12.7	56.9
	-.011	1.234	188.5	9.8	56.3
	-.008	1.238	191.0	10.4	58.8
	-.007	1.240	191.6	7.8	62.5
	-.005	1.244	192.6	8.5	65.2
	-.007	1.242	192.6	9.9	64.7
	-.009	1.242	193.1	9.0	60.3
	-.009	1.244	189.7	7.1	56.4
	-.004	1.251	189.6	7.0	66.1
	.003	1.257	184.4	8.5	81.3
	.010	1.268	180.5	7.2	94.8
	.010	1.268	184.6	10.1	110.7
	.010	1.263	189.6	12.3	127.4
	.010	1.258	194.5	17.4	129.4
	.013	1.261	199.5	17.0	129.0
	.020	1.260	201.1	18.6	137.2
	.013	1.255	193.2	17.9	133.1
	.017	1.266	185.9	20.3	134.2
	.023	1.275	180.0	18.6	140.5
	.013	1.273	178.9	16.0	145.6
	.008	1.269	182.7	15.9	147.5
	.021	1.271	187.4	18.4	160.3
	.035	1.277	192.0	16.5	168.2
	.040	1.274	190.6	14.3	173.4
	.049	1.268	190.3	15.2	179.3
	.059	1.271	187.1	17.7	185.5
	.070	1.284	186.6	15.2	190.5
	.061	1.279	185.2	14.4	191.0
	.053	1.277	186.6	13.6	194.8
	.053	1.280	185.9	14.3	199.3
	.053	1.286	187.8	10.5	202.4
	.052	1.288	186.8	10.4	203.5
	.045	1.288	187.6	11.2	205.8
	.042	1.289	186.6	12.8	205.4
	.046	1.298	188.1	12.9	205.5
	.045	1.297	186.8	14.2	206.6
	.030	1.281	186.8	13.7	204.9
	.032	1.277	187.1	12.7	204.9
	.043	1.289	189.8	14.3	208.8
	.028	1.283	187.6	12.1	209.1
	.022	1.278	188.7	10.7	208.0
	.040	1.299	191.3	12.3	214.9
	.041	1.306	190.4	9.3	216.9
	.024	1.293	187.1	4.5	214.8
	.043	1.302	191.9	7.6	219.5
	.040	1.306	191.0	6.8	222.6
Test Lane	.025	1.295	188.4	3.7	221.2
	.033	1.301	190.3	6.4	225.4
	.030	1.300	190.3	5.0	227.4
	.016	1.298	187.5	2.9	227.1
	.028	1.308	188.4	3.1	231.3
	.027	1.306	188.4	1.7	232.3
	.021	1.300	187.2	.2	234.1
	.035	1.311	190.0	1.0	237.6
	.028	1.306	187.5	-1.3	237.5
	.023	1.300	187.9	-3.2	236.8
	.024	1.307	190.4	-1.6	240.0
	.019	1.304	191.5	-3.0	240.7
	.008	1.299	188.1	-2.1	242.6
	.012	1.302	189.4	-2.1	248.4
	.004	1.301	188.1	-1.9	250.6
	.003	1.304	187.2	-1.8	250.0
	.004	1.310	185.5	.0	249.8
	-.006	1.306	184.9	-2.9	248.0
	.004	1.315	187.2	-1.4	246.7
	-.004	1.309	186.0	-1.5	242.2
	-.005	1.311	184.9	-1.5	242.1
	-.013	1.312	184.1	-4.4	241.0
	-.013	1.314	185.6	-2.3	237.4
	-.013	1.314	186.3	-1.6	233.8
	-.012	1.319	184.9	-1.5	232.9
	-.008	1.320	186.2	-.2	231.0
	-.006	1.319	187.1	2.0	226.0
	-.010	1.316	187.6	3.0	225.0
	-.021	1.313	184.7	5.5	225.7
	-.021	1.315	186.3	5.9	224.5
	-.020	1.316	186.9	8.2	225.2
	-.017	1.320	191.8	9.2	228.9
	-.010	1.321	192.2	13.1	232.8
	-.012	1.321	190.7	10.2	233.6
	-.012	1.323	189.6	10.6	236.5
	-.024	1.316	187.5	11.9	235.8
	-.022	1.322	183.4	13.8	234.4
	-.018	1.330	182.4	13.0	234.3
	-.027	1.323	185.0	14.0	232.8
	-.021	1.325	187.6	17.9	234.3
	-.026	1.324	186.9	17.4	234.4
	-.024	1.322	186.5	16.5	237.1
	-.027	1.320	187.8	14.7	237.8
	-.021	1.327	187.2	19.1	238.8
	1.046	1.333	186.9	16.8	241.4
	1.060	1.338	187.1	15.0	242.3
	1.058	1.336	187.4	16.3	243.3
	1.055	1.331	187.4	16.8	242.0
	1.061	1.331	189.3	13.5	243.3
	-.013	1.317	188.7	14.9	238.8
	-.022	1.321	192.3	14.5	239.4
	-.024	1.321	188.8	13.8	235.9
	-.024	1.320	181.3	17.9	224.2
	-.030	1.323	168.7	17.0	205.8
	-.049	1.320	164.2	13.5	188.8
	-.042	1.326	168.2	18.2	180.7
Overrun	-.066	1.319	183.1	16.1	166.1
	-.066	1.315	197.6	13.9	167.1
	-.068	1.295	210.1	15.1	169.2
	-.058	1.249	209.0	17.9	162.6

(Continued)

Table 3 (Concluded)

Test No. 48 ; 90-deg yaw angle

	V_w m/sec	V_c m/sec	W N	B N	S N
Approach	-.025	1.193	191.8	-.9	40.2
	-.026	1.240	193.7	.9	43.5
	-.023	1.244	191.5	2.2	53.0
	-.013	1.251	192.8	1.2	52.5
	-.013	1.252	194.2	.6	50.1
	-.013	1.251	194.1	-1.2	48.5
	-.023	1.245	191.2	-5.0	49.4
	-.029	1.242	190.0	-5.2	53.0
	-.032	1.239	190.6	-4.4	54.8
	-.028	1.239	190.7	-3.1	52.4
	-.027	1.244	190.3	.1	48.4
	-.025	1.249	191.6	-.7	45.7
	-.019	1.255	192.0	-.4	46.7
	-.029	1.257	191.0	.4	49.5
	-.026	1.264	190.7	-1.1	55.0
	-.024	1.267	192.6	-.6	57.1
	-.022	1.270	191.9	.8	56.1
	-.027	1.269	191.9	-2.1	53.1
	-.029	1.263	191.5	-3.1	53.2
	-.029	1.261	191.6	-2.0	56.6
	-.023	1.263	191.2	-4.4	63.9
	-.017	1.270	188.5	-2.8	66.4
	-.016	1.272	184.7	.2	73.2
	-.009	1.276	182.7	-.6	84.4
	-.016	1.271	184.0	-.0	101.6
	-.017	1.264	187.4	4.2	116.9
	-.020	1.264	194.0	3.8	134.3
	-.012	1.269	196.9	5.2	145.9
	-.017	1.271	196.4	6.6	145.3
	-.020	1.274	191.5	6.4	137.4
	-.022	1.284	187.1	4.5	134.3
	-.028	1.278	184.6	4.9	134.4
	-.042	1.271	184.1	5.9	135.7
	-.036	1.273	188.1	6.7	144.3
	-.027	1.280	191.5	8.1	155.9
	-.028	1.278	189.8	8.9	163.7
	-.028	1.282	186.8	9.8	172.9
	-.024	1.288	186.3	10.1	182.0
	-.026	1.289	184.3	12.2	187.3
	-.037	1.286	181.2	13.4	188.7
	-.034	1.289	180.6	15.0	192.9
	-.034	1.292	183.0	17.5	196.9
	-.038	1.293	186.3	16.7	201.1
	-.029	1.297	190.7	17.9	209.2
	-.022	1.300	193.4	19.0	219.1
	-.035	1.291	192.2	19.5	222.6
	-.037	1.290	190.7	20.0	221.3
	-.023	1.303	189.3	23.4	221.9
	-.034	1.303	187.4	22.8	217.9
	-.041	1.297	184.7	20.1	207.5
	-.029	1.308	188.4	19.8	202.7
	-.025	1.312	187.2	19.1	202.4
	-.044	1.296	186.0	18.1	198.1
	-.040	1.296	186.0	18.0	196.9
	-.034	1.305	188.4	20.4	200.9
	-.044	1.297	185.7	19.2	200.8
	-.046	1.297	187.1	19.4	201.3
	-.036	1.304	186.9	18.3	202.5
	-.041	1.303	185.7	19.6	202.0
	-.040	1.303	187.1	20.1	202.8
Test Lane	-.036	1.308	188.1	21.7	205.4
	-.040	1.301	188.1	21.8	206.4
	-.033	1.306	189.6	23.4	207.9
	-.026	1.312	190.1	22.9	210.3
	-.029	1.312	189.0	22.5	212.1
	-.029	1.308	189.3	22.0	210.3
	-.026	1.314	189.3	21.2	208.0
	-.025	1.315	189.0	20.4	206.7
	-.026	1.312	189.3	19.1	203.2
	-.021	1.318	189.3	21.4	200.7
	-.021	1.324	187.9	19.6	200.7
	-.023	1.324	187.8	18.1	199.6
	-.024	1.322	187.2	19.2	199.6
	-.037	1.319	185.6	18.5	200.2
	-.036	1.317	186.9	16.1	201.3
	-.036	1.313	185.7	17.5	202.5
	-.043	1.307	185.2	20.3	204.1
	-.043	1.311	187.6	19.9	206.1
	-.037	1.315	188.2	20.9	208.2
	-.045	1.312	185.6	22.3	208.2
	-.045	1.319	187.9	23.1	208.0
	-.043	1.319	188.7	21.2	209.1
	-.042	1.320	188.2	22.6	212.3
	-.041	1.320	185.9	20.5	212.4
	-.039	1.320	187.8	18.2	211.9
	-.033	1.322	188.1	20.0	213.9
	-.028	1.324	188.1	19.8	213.4
	-.028	1.324	185.9	16.9	209.5
	-.025	1.327	188.2	18.9	207.7
	-.025	1.330	188.8	20.3	208.6
	-.029	1.325	187.8	17.4	206.6
	-.029	1.330	187.9	15.7	206.0
	-.034	1.2<4	189.8	18.0	203.3
	-.034	1.2<4	188.4	16.0	203.3
	-.029	1.325	188.4	12.8	201.1
	-.034	1.325	188.4	12.8	198.0
	-.029	1.329	188.4	14.8	198.0
	-.033	1.328	187.2	10.8	198.7
	-.026	1.332	188.1	12.7	200.2
	-.030	1.328	187.8	13.1	200.1
	-.030	1.327	187.9	14.0	200.6
	-.027	1.333	189.1	13.9	202.5
	-.027	1.331	187.9	14.9	202.8
	-.024	1.338	190.1	16.3	205.5
	-.026	1.339	187.8	13.8	206.0
	-.018	1.343	188.1	15.9	209.0
	-.027	1.338	186.5	14.6	207.6
	-.055	1.344	189.6	16.3	210.6
	-.063	1.336	190.3	15.8	211.4
	-.065	1.335	191.8	21.5	211.8
	-.069	1.339	188.4	16.7	208.5
Overrun	-.069	1.338	179.9	14.8	200.1
	-.029	1.346	166.6	14.4	183.3
	-.032	1.346	158.2	10.2	161.3
	-.020	1.354	164.6	10.4	149.6
	-.032	1.349	184.3	16.1	134.6
	-.032	1.342	200.4	16.5	116.6
	-.034	1.2<4	211.8	5.3	93.1
	-.024	1.299	213.3	5.1	80.4
	-.027	1.221	209.9	-.2	62.9

(23 of 23 Sheets)